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REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL - JULY 1972. VOLUME 1

National Field Investigations Center - Denver
Denver, Colorado

April 1973

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ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF ENFORCEMENT

REMOTE SENSING REPORT
SAN FRANCISCO BAY AREA

APRIL - JULY, 1972

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U S Department of Commerce
Springfield VA 22151

National Field Investigations Center - Denver

April 197~~2~~3

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REMOTE SENSING REPORT
SAN FRANCISCO BAY AREA
APRIL - JULY 1972

I. INTRODUCTION

An aerial remote sensing program, requested by Region IX, was carried out in the San Francisco Bay Area in April and July 1972. The general area is shown in Figure 1. During the planning phase of the mission the Bay area was divided into four sections and labeled A, B, C and D, as outlined in Figure 1.

II. MISSION PURPOSE

The purpose of this aerial reconnaissance program was to fulfill the following objectives:

a) Provide location and description of industrial discharges during day and night-time periods. This effort was designed to provide information for the waste source survey performed by NFIC-Denver.

b) Document the presence of and dispersion patterns for the Bay area municipal sewage treatment plant (STP) discharges during day and night-time periods.

c) Document the flow patterns of Bay waters in the following areas:

    (1) Carquinez Bridge near the mouth of the Carquinez Strait.

    (2) Bay Bridge between San Francisco and Oakland.

    (3) Golden Gate Strait.

FIGURE I

LOCATION MAP

SAN FRANCISCO BAY

2-A

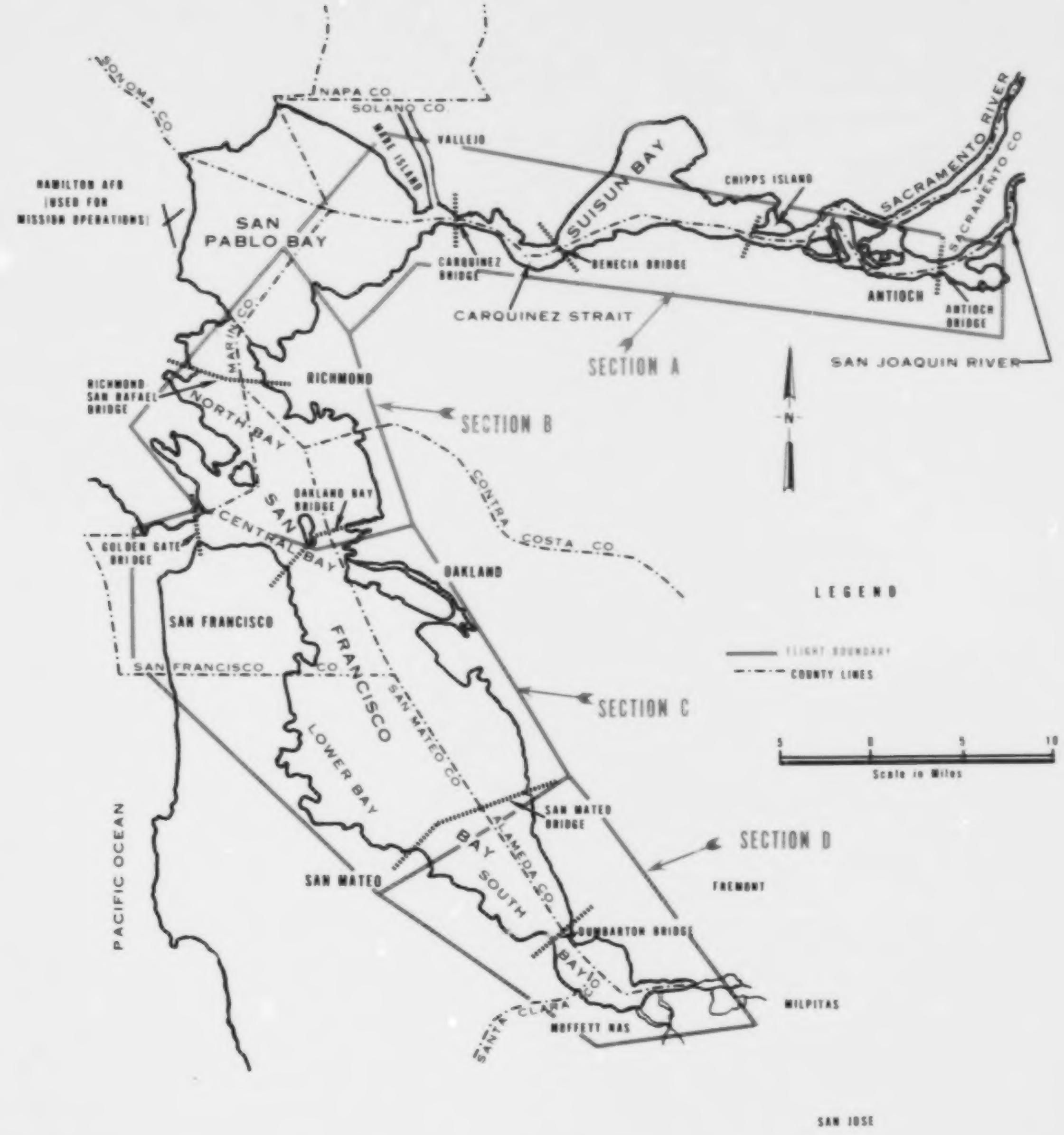

NAPA CO.
SOLANO CO.
SONOMA CO.
VALLEJO
MARE ISLAND
HAMILTON AFB (USED FOR MISSION OPERATIONS)
SAN PABLO BAY
SUISUN BAY
CHIPPS ISLAND
SACRAMENTO RIVER
SACRAMENTO CO.
CARQUINEZ BRIDGE
BENECIA BRIDGE
CARQUINEZ STRAIT
ANTIOCH
ANTIOCH BRIDGE
SAN JOAQUIN RIVER
SECTION A
MARIN CO.
RICHMOND
RICHMOND-SAN RAFAEL BRIDGE
NORTH BAY
SECTION B
N
CONTRA COSTA CO
SAN
OAKLAND BAY BRIDGE
CENTRAL BAY
GOLDEN GATE BRIDGE
OAKLAND
SAN FRANCISCO
FRANCISCO
SAN FRANCISCO CO
SAN MATEO CO
LEGEND
FLIGHT BOUNDARY
COUNTY LINES
SECTION C
5 0 5 10
Scale in Miles
LOWER BAY
SAN MATEO BRIDGE
SECTION D
PACIFIC OCEAN
BAY
SOUTH
ALAMEDA CO.
SAN MATEO
FREMONT
DUMBARTON BRIDGE
BAY
SANTA CLARA
MOFFETT NAS
MILPITAS
SAN JOSE

Figure 1. Location Map San Francisco Bay Area

III. BACKGROUND INFORMATION

The San Francisco Bay Area is the receiving water for approximately 250 discrete sources of municipal and industrial waste discharges. Approximately 150 of the waste sources are located in close proximity to San Francisco, San Pablo, and Suisun Bays. The total volume of wastewater discharged by these 150 sources averaged 3.1 million cubic meters per day [mcmd] (820 million gallons per day [mgd]) in 1971. Municipal sources contribute nearly 58 percent [1.854 mcmd] (490 mgd) of the total wastewater volume.

The major sources of industrial wastes are oil refineries, petrochemical and chemical manufacturing plants, pulp/paper mills, and food processing plants. These industries are located primarily along the southern shore of Suisun and San Pablo Bays between the cities of Antioch and Richmond, California.

There are 52 municipal sources that discharge an average of more than 0.5 mgd of wastewater each. The three largest are:

a) City of San Jose - 314 thousand cubic meters per day [kcmd] (83 mgd).

b) East Bay M.U.D. - 299 kcmd (79 mgd).

c) City of San Francisco - 242 kcmd (64 mgd) (North Point Plant).

These three sources comprise approximately 28 percent of the total wastewater volume.

Federal installations discharge nearly 83.3 kcmd (22 mgd) of domestic and industrial wastes into the Bay area.

IV. PHYSICAL DESCRIPTION OF THE BAY AREA

San Francisco Bay is a distinctive geographical feature in the Northern California area; unusual hills, striking in appearance, lie on the outer periphery of the Bay area. It covers approximately 1,127 square kilometers (435 square miles). San Francisco Bay ranges from 4.8 to 19.3 kilometers (3 to 12 miles) in width and is about 80 kilometers (50 miles) in length.

Westernmost of the numerous large metropolitan areas in the City of San Francisco, situated on a land mass immediately south of the strait, Golden Gate, that is the Bay connection with the Pacific Ocean. The cities of Richmond, Oakland, and Berkeley are east of San Francisco across the Bay from Golden Gate. To the northewast are Martinez, Vallejo, Pittsburg, and Antioch. South of the San Francisco area lie the cities of San Mateo, Burlingame, Redwood City, San Jose, Hayward, San Leandro, and Palo Alto. North of the area are Rodeo, San Rafael, Walnut Creek, Napa, Petaluma, and Antioch.

The periphery of the Bay is characterized by flatlands and tidal marshland. Approximately 80 percent of this marshland has been "reclaimed," chiefly for agricultural use and salt ponds. A great amount of these lands, or shoreline, has a flat slope. As a result, the area between mean high and low water is relatively large which totals 166 square kilometers (64 square miles). Another result of the effect of this flat-slope topography is the shallow depth of the Bay. Average depths are about 6.1 meters (20 feet). Immediately east of the Golden Gate, which is only two miles wide, the average depth of the Bay increases to 13.1 meters (43 feet), with a maximum depth of 40 meters (130 feet). The Carquinez Strait maintains a maximum depth of 27.5 meters (90 feet).

V. AIRCRAFT SENSOR CONFIGURATION/DATA

Four high performance aircraft were used to carry out each of the two remote sensing missions. The sensors, carried on-board each of these aircraft, were three cameras and an infrared line scanner OIRLS). The cameras on each aircraft were KS-87B Aerial Framing Cameras equipped with 152 mm (6 inch) focal length lens assemblies. They were mounted in the aircraft in their respective vertical positions as shown in Figure 2.

The framing cameras were up loaded with different film and optical filter combinations as follows:

a) Camera Station 1. Kodak S0-397 Aerographic Ektachrome Film with a Wratten HF-3/HF-5 gelatin optical filter combination. This film is 127 mm (5 inches) wide providing a true color transparency measuring approximately 114 mm x 114 mm (4.5"x4.5"). The filter combination prohibits ultra-violet light from reaching the film eliminating the effects of atmospheric haze.

b) Camera Station 2. Kodak 2403 Tri-X Aerographic Film (127 mm wide) with a Wratten 47A gelatin optical filter. This film filter combination provides a black-white negative having been exposed to near ultraviolet and deep blue optical energy. This sensor was primarily used for the detection of oil slicks.

c) Camera Station 3. Kodak 2443 Aerochrome Infrared Film with a Wratten 16 gelatin optical filter. This film is also 127 mm wide (5 inches) resulting in color transparencies measuring approximately 114 mm x 114 mm.

LEGEND

1 KS-87 FRAMING CAMERAS
2 INFRARED LINE SCANNER

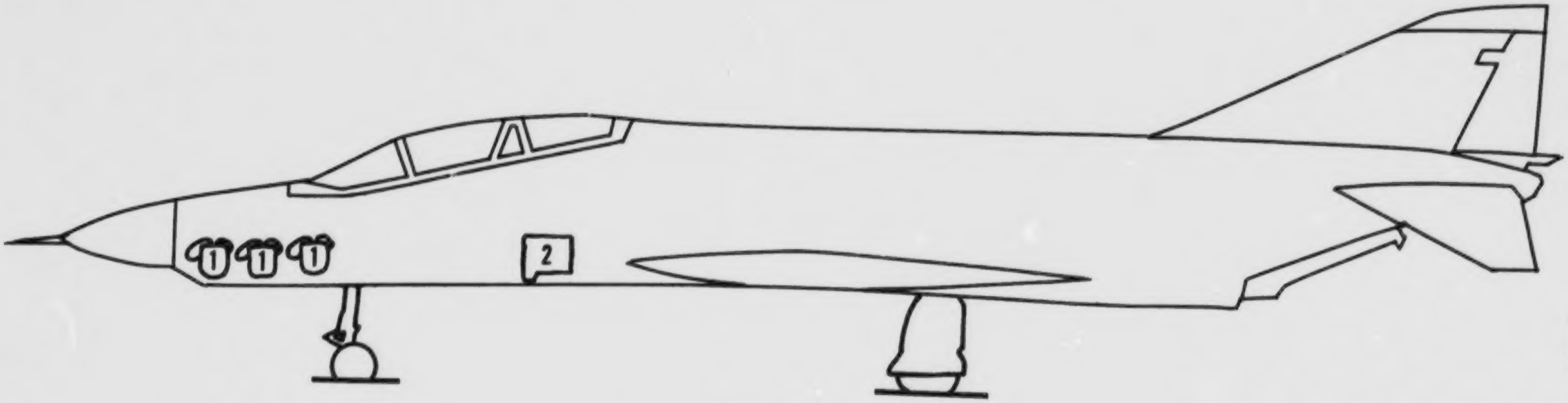


Figure 2. Aircraft Sensor Locations

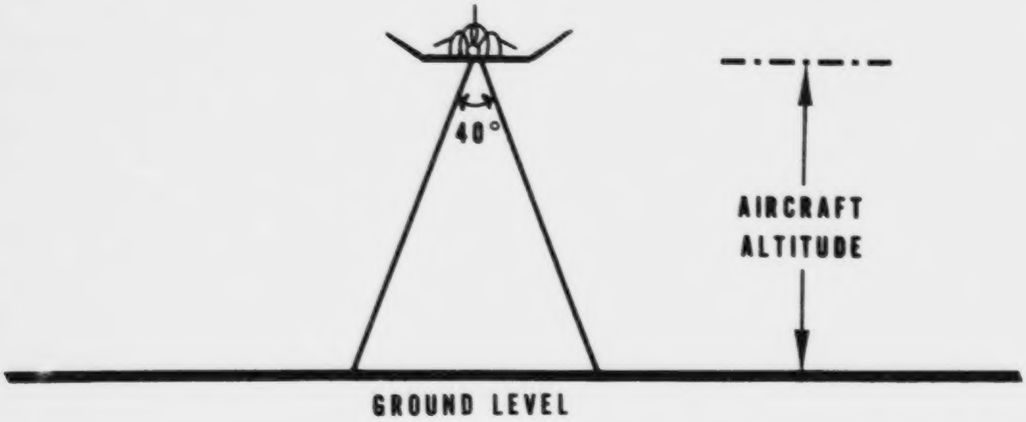
The Wratten 16 filter (deep orange in color) transmits a portion of the visible optical spectrum, i.e., deep green, yellow, orange, red, along with the near infrared energy from 7.0 to 1.0 microns. This film presents a modified color or false color rendition in the processed transparency unlike the more familiar true-color films. It has an emulsion layer that is sensitive to the near infrared in addition to the red and green layers, whereas the true-color ektachrome films have red, green, and blue sensitive layers. (Every color in the visible optical spectrum is formed in the true color film by various combinations of red, green and blue dyes similar to the red, green and blue dots on the front of a color television picture tube.) The modified or false color rendition comes into play when the exposed image on the infrared film is processed.

In the finished transparency, the scene objects (trees, plants) producing infrared exposure, appear red in color, while red and green objects produce green and blue images, respectively. The most important asset of this film is its capability of recording the presence of various levels of chlorophyll in plant growth. The leaves on a healthy tree will record as a bright red image rather than the usual green. Degraded foliage will approach a brownish red color. The orange filter is used to keep all blue light from reaching the film which would cause an unbalance in the normal red, green, blue color balance.

The spectral sensitivity data for each film and the optical filter transmittance curves are shown in Appendix A.

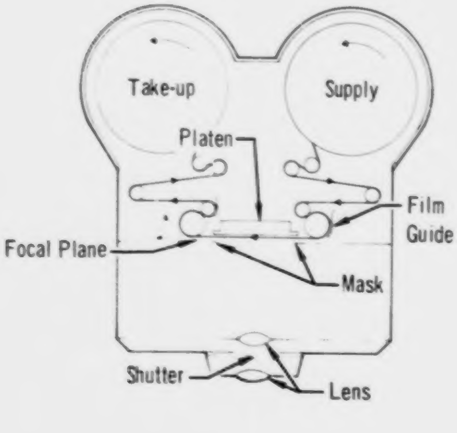
Information regarding the development process for each type of film is provided in Appendix B.

The viewing angle of the KS-87 B framing cameras was 41° centered about the aircraft's nadir as shown below:


40°
AIRCRAFT
ALTITUDE
GROUND LEVEL

Viewing Angle of a Framing Camera Configured with a 6-inch Focal Length.

A diagram of a typical framing camera is provided below:

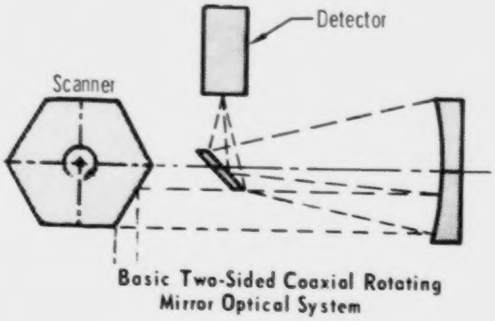

Take-up
Supply
Platen
Film Guide
Focal Plane
Mask
Shutter
Lens

Film Advances Frame by Frame

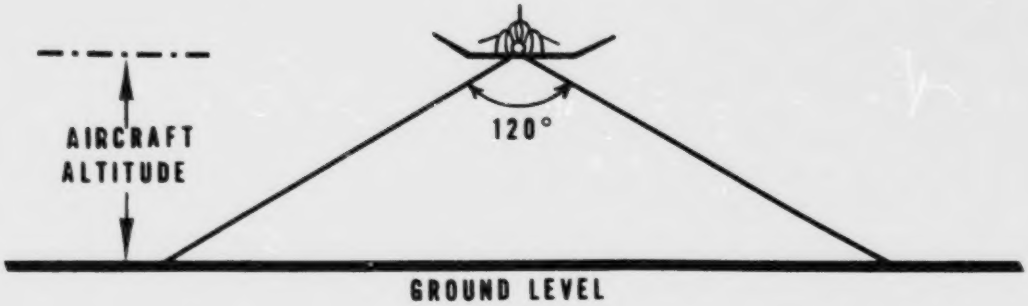
Framing Camera

An infrared line scanner (IRLS), which records a thermal map of an imaged area, completed the array of airborne sensors used on this mission. The IRLS uses an infrared detector in an electroptic system to record on film the amount of infrared energy detected in the imaged area. The effective focal length of the IRLS is 1.15 inches and the field of view is 120° perpendicular to the line of flight.

The three basic units in an infrared reconnaissance set are scanner optics, a detector, and a recording unit. The scanner collects the infrared emissions from the ground and reflects them to a parabolic mirror. The parabolic mirror focuses the infrared emissions onto the detector. The detector converts the infrared energy collected by the scanner into an electrical signal. In the recording unit the electrical signal is converted to visible light through a cathode ray tube which is then recorded on ordinary black and white film. The diagrams below depict the optical collection system and the lateral field of view of the IRLS, respectively.



IRLS Optical Collection System



Field-of-View of the IRLS

Appendix C contains information pertinent to aerial sensors in respect to focal length, angle of view, and the effects of focal length and altitude on scale and ground coverage.

VI. FLIGHT PARAMETER DATA

The flight parameter data specifies the particular values of the following aerial reconnaissance variables:

a) date of flight(s)

b) time of flight

c) direction-of-flight of each aircraft (target area)

d) air speed of flight (knots)

e) aircraft altitude above ground level (AGL)

f) sensors to be used.

The values of these parameters are given in Table VI-1.

TABLE VI-1

FLIGHT PARAMETER DATA

		April 1972		July 1972		
Date of Flight		26	27	25	26	27
Time of Flight		1000-1200 1400-1600	1000-1200	1330-1600	0330-0430 1330-1500	0130-0230 1400-1530
Air Speed		350± 25 knots			350± 25 knots	
Altitude AGL (Feet)	Day	3000'±50' 8000' 18000'	3000'±50' 8000'	3000'±50' 7500'	3000'±50'	3000"±50'
	Night	--	--	1500'	--	1500'
Target Area*	Day	A,B,C,D	A,B,C,D	A,B,C,D	Parts of A,B,C,D	16 targets
	Night	--	--	--	16 targets	16 targets
Sensors	Day	All	All	All	All	All
	Night	--	--	IRLS	--	IRLS

*Sections A,B,C,D are shown in Figure 1. The 16 targets will be defined in another Section of this report.

The airspeed and low altitude flight restrictions were imposed by the FAA Oakland Bay TRACON Center because of the heavy commercial and general aviation traffic in the Bay area. The jet aircraft approach and departure patterns for the airports in this area, are shown in Figure 3.

FREQ 351.8

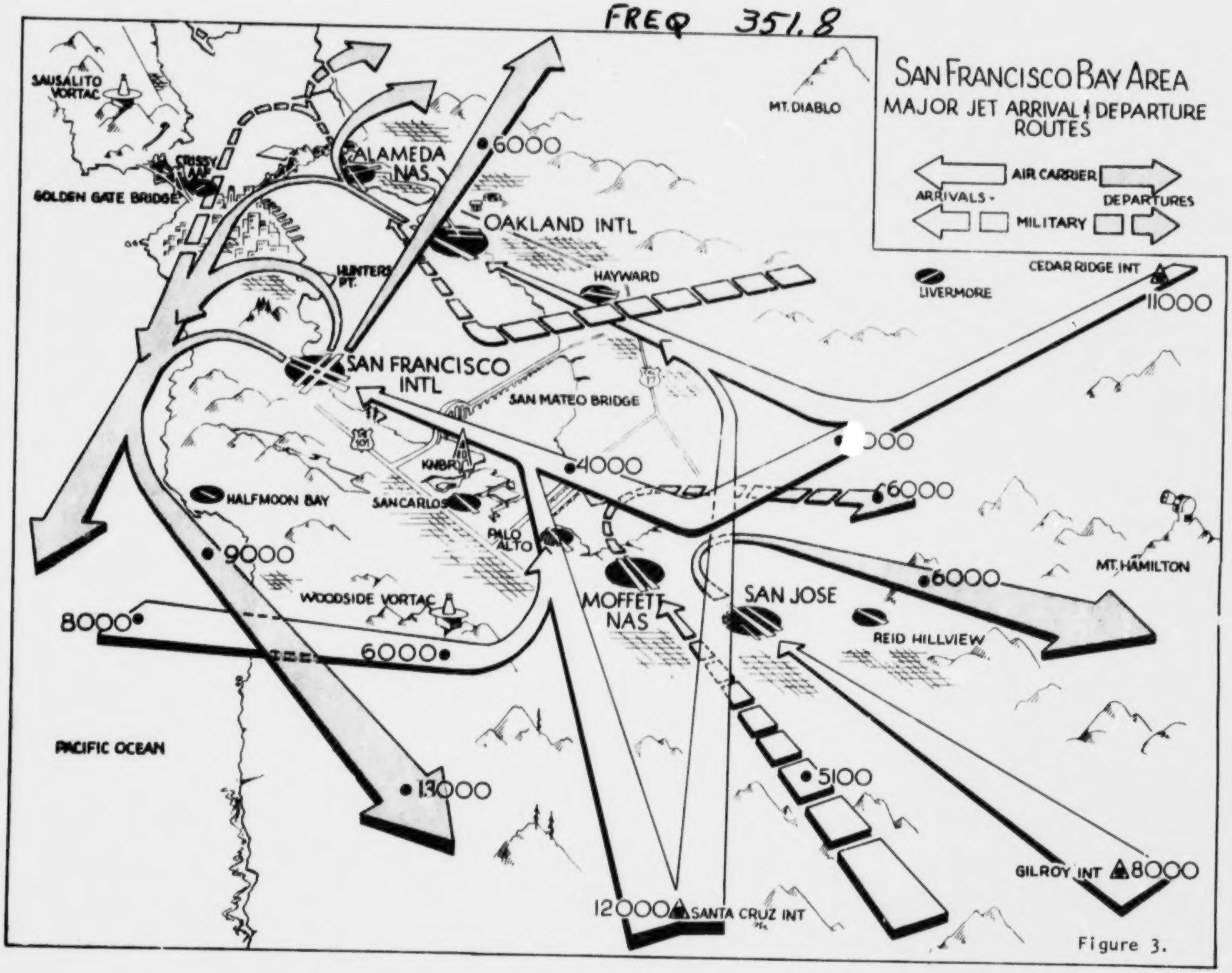

SAN FRANCISCO BAY AREA
MAJOR JET ARRIVAL & DEPARTURE ROUTES
AIR CARRIER
ARRIVALS -
DEPARTURES
MILITARY
MT. DIABLO
SAUSALITO VORTAC
CRISSY
GOLDEN GATE BRIDGE
ALAMEDA NAS
6000
OAKLAND INTL
HUNTERS PT.
HAYWARD
LIVERMORE
CEDAR RIDGE INT
11000
SAN FRANCISCO INTL
SAN MATEO BRIDGE
KNBR
4000
6000
HALFMOON BAY
SAN CARLOS
PALO ALTO
9000
MOFFETT NAS
SAN JOSE
6000
MT. HAMILTON
REID HILLVIEW
WOODSIDE VORTAC
8000
6000
PACIFIC OCEAN
13000
5100
GILROY INT
8000
12000
SANTA CRUZ INT

Figure 3.

VII. WEATHER INFORMATION[1]

Complete weather information for April 1972 and July 1972 is provided for the following locations in the Bay area:

a) San Francisco International Airport

b) San Francisco Federal Building

c) Oakland International Airport

d) San Jose.

These data, included as the next fourteen pages, gives temperature, wind speed and direction and precipitation values for each 24-hour period. For locations a) through c), weather information for 3-hour intervals is provided.

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

SAN FRANCISCO, CALIFORNIA
INTERNATIONAL AIRPORT
APRIL 1972

Latitude 37° 37' N Longitude 122° 23' W Elevation (ground) 8 ft Standard time used PACIFIC WBAN #23234

Date	Temperature °F: Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65°: Heating	Cooling	Weather types on dates of occurrence (1 Fog, 2 Heavy fog X, 3 Thunderstorm, 4 Ice pellets, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing snow)	Snow, ice pellets or ice on ground at 04AM In.	Precipitation: Water equivalent In.	Snow, ice pellets In.	Avg station pressure In. Elev. 18 feet m.s.l.	Wind: Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Sunshine: Hours and tenths	Percent of possible	Sky cover Tenths: Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	65	51	58	3	46	7	0		0	T	0	30.11	30	9.0	9.8	17	29			7	7	1
2	66	49	58	3	52	7	0	1	0	0	0	30.06	29	5.4	9.8	21	30			7	7	2
3	66	48	57	2	51	8	0	1	0	0	0	29.98	31	7.5	9.2	17	30			9	9	3
4	67	54	61	6	51	4	0		0	T	0	29.94	17	5.3	9.5	21	17			10	10	4
5	63	54	59	4	52	6	0	1	0	.19	0	29.87	17	12.5	13.4	29	18			10	10	5
6	63	48	56	1	49	9	0	1	0	.05	0	30.11	26	7.2	8.6	17	28			6	5	6
7	63	44	54	-1	44	11	0		0	0	0	30.18	28	9.9	11.4	21	28			9	6	7
8	62	47	55	0	45	10	0		0	0	0	30.18	30	8.6	10.6	22	28			9	8	8
9	58	47	53	-3	40	12	0		0	0	0	30.07	29	15.5	15.5	21	28			10	9	9
10	60	48	54	-2	41	11	0		0	0	0	30.00	28	7.4	8.5	14	29			8	8	10
11	59	47	53	-3	46	12	0	1	0	.52	0	29.95	20	7.1	12.2	23	21			9	8	11
12	57	46	52	-4	46	13	0	1	0	.26	0	30.01	23	8.3	14.8	23	18			10	8	12
13	58	39*	49*	-7	37	16	0		0	0	0	30.09	30	10.5	11.9	22	28			0	0	13
14	66	41	54	-2	40	11	0		0	0	0	30.06	30	7.6	9.1	20	28			0	0	14
15	69	45	57	1	47	8	0		0	0	0	30.05	31	9.0	10.1	20	29			6	4	15
16	58	47	53	-3	44	12	0		0	0	0	30.07	27	14.2	14.7	28	28			7	4	16
17	61	45	53	-3	39	12	0		0	0	0	30.01	28	13.4	13.5	30	28			5	3	17
18	63	43	53	-3	30	12	0		0	0	0	29.97	30	13.4	14.4	24	28			0	0	18
19	66	47	57	0	31	8	0		0	0	0	30.08	32	11.8	14.1	22	29			0	0	19
20	60	41	51	-6	43	14	0		0	0	0	30.22	28	11.0	12.1	20	25			1	3	20
21	64	49	57	0	45	8	0		0	0	0	30.21	27	12.4	13.4	21	27			2	3	21
22	67	43	55	-2	45	10	0		0	0	0	30.05	28	10.6	12.1	20	28			8	5	22
23	64	44	54	-3	42	11	0	1	0	.05	0	30.04	23	6.5	9.4	21	20			4	6	23
24	61	49	55	-2	46	10	0		0	.13	0	30.13	28	12.2	13.7	22	28			2	3	24
25	63	47	55	-2	42	10	0		0	0	0	30.14	28	10.0	11.2	22	29			4	3	25
26	78	46	62	5	40	3	0		0	0	0	29.97	28	4.0	5.9	18	29			0	0	26
27	79*	51	65*	8	45	0	0		0	0	0	29.97	28	9.1	10.9	28	27			2	1	27
28	59	47	53	-4	40	12	0		0	0	0	30.12	28	21.8	22.0	32	29			0	1	28
29	64	47	56	-1	35	9	0		0	0	0	30.12	29	11.0	12.1	22	28			1	1	29
30	73	44	59	2	39	6	0		0	0	0	30.07	30	8.0	9.2	20	29			0	0	30

Sum	Sum				Total	Total
1922	1398				282	0
Avg	Avg	Avg	Dep	Avg	Dep	Dep
64.1	46.6	55.4	-0.3	43	3	
					Season to date	
					Total	Total
					2919	1
					Dep	Dep
					244	

Number of days

Maximum Temp ≥ 90° ‡	Maximum Temp ≤ 32°	Minimum Temp ≤ 32°	Minimum Temp ≤ 0°
0	0	0	0

Number of days
Precipitation ≥ .01 inch 6
Snow, ice pellets ≥ 1.0 inch 0
Thunderstorms 0
Heavy fog X 0
Clear 12 Partly cloudy 8 Cloudy 10

Precipitation Total	Snow, ice pellets Total	For the month: Avg station pressure	Resultant direction	Resultant speed	Average speed	Fastest mile Speed	Direction	Sunshine Total	% for month	Sky cover Sum	Sum
1.20	0	30.06	28	8.5	11.8	32	29			146	132
Dep						Date	28	Possible		Avg	Avg
-0.10										4.9	4.4

Greatest in 24 hours and dates: Precipitation	Date	Snow, ice pellets	Date	Greatest depth on ground of snow, ice pellets or ice and date	Date
.52	11	0		0	

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1	T	T	T																						1
2																									2
3																									3
4															T										4
5						T		.03	.03	.01	T	.04	.02	T	T					T		T	T	.06	5
6	.02	.01	T	T	.01	.01																			6
7																									7
8																									8
9																									9
10																									10
11	T	.03	.07	.06	T	.01	.01	T	.26	T	.02			T	.01		T	T	.05	T					11
12						T	T	.02	.04	.02	.01	T		.01	.14	T	T	.01	T	T	.01				12
13																									13
14																									14
15																									15
16																									16
17																									17
18																									18
19																									19
20																									20
21																									21
22																									22
23																					T	.04	.01	23
24	.01	.05	.03	.04																					24
25																									25
26																									26
27																									27
28																									28
29																									29
30																									30

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.

Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North, i.e., 09 = East, 18 = South, 27 = West, 36 = North and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17 speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data $1.00 per year including annual summary if published. Single copy: 10 cents for monthly summary; 15 cents for annual summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	AVERAGES: Sky cover Tenths	Station pressure In.	Temperature: Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind: Direction	Speed m.p.h.
01	4	30.06	50	47	44	79	8.6	27	5.9
04	4	30.05	49	46	43	80	7.5	27	4.3
07	5	30.07	51	47	42	74	7.1	29	3.7
10	5	30.09	58	51	42	59	10.6	32	4.4
13	6	30.07	62	52	42	51	14.8	28	12.1
16	4	30.04	59	51	43	57	18.0	28	15.8
19	5	30.04	53	49	44	71	15.6	28	14.3
22	4	30.06	52	48	44	75	11.9	28	9.5

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER Tenths	CEILING Hnds. of ft.	VISIBILITY		WEATHER	TEMPERATURE			REL. HUM. %	WIND	
			WHOLE MILES	16ths MILE		AIR °F	WET BULB °F	DEW PT. °F		DIR	SPEED Knots
					DAY 01						
01	10	100	12		R	51	49	47	86	32	4
04	10	100	12			51	49	47	86	18	3
07	10	100	10			52	49	47	83	30	9
10	10	130	12			56	49	43	62	29	10
13	9	130	30			62	52	43	50	32	10
16	8	130	50			61	53	45	56	29	14
19	1	UNL	15			56	50	47	77	30	9
22	7	7	15			53	52	51	93	29	9
					DAY 02						
01	10	7	12			53	52	51	93	31	8
04	10	7	12			53	51	50	90	21	4
07	10	7	6		F	53	52	51	93	17	5
10	10	7	8			56	54	53	90	08	6
13	8	UNL	12			63	57	53	70	08	4
16	1	UNL	20			59	56	53	81	28	17
19	1	UNL	7			53	52	51	93	29	14
22	8	UNL	7			52	51	50	93	30	10
					DAY 03						
01	10	4	7			50	49	49	96	30	8
04	10	6	10			52	51	50	93	26	4
07	8	250	7			49	48	48	96	30	8
10	3	UNL	7			57	54	51	80	08	6
13	10	250	12			65	58	52	63	31	14
16	10	250	30			58	54	50	75	31	14
19	10	250	15			56	54	52	87	32	6
22	10	150	15			55	53	52	90	30	8
					DAY 04						
01	10	150	15			55	53	51	86	13	5
04	10	12	15			55	53	52	90	10	5
07	10	150	15			54	52	51	90	31	6
10	10	200	8			60	57	54	81	02	4
13	10	150	12			66	59	53	63	20	13
16	10	70	30			66	56	48	52	13	7
19	10	70	15			64	55	47	54	21	14
22	10	65	15			62	55	49	63	16	12
					DAY 05						
01	10	150	15			62	55	50	65	16	11
04	10	130	15			62	55	50	65	18	13
07	10	130	50			60	54	49	67	11	7
10	10	120	30		R	59	56	53	81	17	12
13	10	17	7		R	58	56	54	87	17	12
16	10	18	30			56	54	54	87	17	14
19	9	32	15			56	54	52	87	20	13
22	10	24	15		RW	56	54	52	87	18	11
					DAY 06						
01	10	10	7		R	54	53	53	96	21	7
04	8	25	12			54	53	52	93	18	5
07	7	30	8			53	52	51	93	31	3
10	8	100	15			58	54	51	78	28	9
13	9	45	30			57	53	49	75	27	10
16	1	UNL	50			60	51	42	52	26	12
19	0	UNL	15			54	50	47	77	26	8
22	0	UNL	15			51	49	47	86	30	6
					DAY 07						
01	0	UNL	15			49	45	41	74	23	4
04	0	UNL	15			48	45	42	80	25	4
07	10	UNL	12			49	46	44	83	29	5
10	10	UNL	10			58	52	47	67	02	6
13	10	UNL	30			62	52	42	48	28	14
16	10	UNL	30			58	53	48	70	28	18
19	8	UNL	15			52	48	44	74	27	12
22	0	UNL	15			51	47	42	71	26	16
					DAY 08						
01	3	UNL	15			49	46	43	80	29	6
04	4	UNL	15			49	47	45	86	29	6
07	5	UNL	9			51	48	46	83	07	2
10	10	UNL	12			56	51	46	69	07	6
13	10	UNL	20			62	53	45	54	30	16
16	10	250	15			57	52	48	72	29	14
19	10	UNL	15			53	50	47	80	28	10
22	8	250	15			51	47	42	71	29	14
					DAY 09						
01	5	UNL	15			50	45	40	69	29	11
04	10	UNL	15			49	45	40	71	29	13
07	7	UNL	25			50	45	39	66	29	13
10	10	UNL	50			55	46	36	49	30	14
13	10	250	50			57	49	40	53	29	15
16	10	250	30			56	49	41	57	29	16
19	10	250	15			51	46	40	66	28	16
22	10	UNL	15			50	46	41	71	29	10
					DAY 10						
01	4	UNL	15			49	46	42	77	28	9
04	3	UNL	15			48	45	42	80	26	6
07	10	180	20			50	45	40	69	27	6
10	3	UNL	30			57	48	38	49	30	5
13	9	UNL	30			59	50	40	50	30	8
16	10	250	30			59	50	40	50	29	11
19	9	250	15			52	48	44	74	30	10
22	9	100	15			52	46	39	61	17	4
					DAY 11						
01	10	80	15		R	52	47	42	69	12	6
04	10	30	12		R	49	47	46	89	14	10
07	10	23	12			51	49	48	90	13	15
10	5	UNL	10			56	53	50	80	20	19
13	10	24	20			56	51	46	69	25	14
16	8	19	30			55	50	45	69	27	11
19	10	30	12		RW	50	48	48	86	26	7
22	5	UNL	15			49	47	45	86	18	7
					DAY 12						
01	1	UNL	15			47	45	44	89	17	9
04	10	25	15			49	46	43	80	12	7
07	10	50	12		RW	49	46	44	83	18	10
10	10	16	4		RWF	51	50	49	93	18	18
13	10	21	20			57	54	51	80	22	14
16	10	15	10		RW	53	51	49	86	27	15
19	10	38	15			51	48	45	80	29	13
22	5	UNL	15			48	44	39	71	30	17
					DAY 13						
01	0	UNL	15			44	40	36	74	31	9
04	0	UNL	15			41	38	33	73	33	9
07	0	UNL	50			45	39	31	58	35	6
10	2	UNL	30			53	45	35	51	36	8
13	0	UNL	50			57	47	37	47	28	11
16	0	UNL	50			57	48	38	49	28	19
19	0	UNL	30			51	47	42	71	28	12
22	0	UNL	15			51	47	43	74	29	9
					DAY 14						
01	0	UNL	15			49	46	43	80	28	3
04	0	UNL	15			45	41	37	74	25	3
07	0	UNL	50			52	48	44	74	01	5
10	0	UNL	50			60	48	35	39	36	9
13	0	UNL	50			64	52	40	42	28	11
16	0	UNL	50			65	51	37	36	30	15
19	0	UNL	50			58	47	36	41	29	11
22	0	UNL	15			52	49	46	80	29	6
					DAY 15						
01	0	UNL	12			50	48	47	89	29	7
04	0	UNL	12			47	43	38	71	29	6
07	0	UNL	10			50	47	45	83	30	3
10	10	UNL	10			60	54	49	67	04	6
13	8	UNL	30			67	58	50	55	30	10
16	3	UNL	20			65	57	51	61	31	15
19	10	UNL	10			53	50	48	83	30	16
22	3	UNL	12			51	49	47	86	30	7
					DAY 16						
01	0	UNL	12			50	48	46	86	28	8
04	0	UNL	12			48	46	45	89	31	3
07	9	250	8			51	49	47	86	27	5
10	9	250	10			56	51	46	69	28	16
13	8	UNL	15			57	50	43	60	28	22
16	1	UNL	12			54	48	41	62	25	22
19	1	UNL	9			51	48	41	69	27	15
22	0	UNL	12			50	46	42	74	29	11
					DAY 17						
01	0	UNL	12			48	44	40	74	26	10
04	0	UNL	12			47	44	40	77	28	8
07	7	UNL	12			48	44	40	74	29	8
10	8	UNL	12			55	48	40	57	28	4
13	6	UNL	30			58	48	38	48	28	18
16	0	UNL	30			56	48	39	53	27	18
19	0	UNL	10			49	44	38	66	28	15
22	0	UNL	15			48	43	38	68	28	13
					DAY 18						
01	0	UNL	15			46	42	38	74	28	9
04	0	UNL	15			45	41	37	74	29	8
07	0	UNL	50			50	38	19	29	31	9
10	0	UNL	50			57	42	18	22	35	14
13	0	UNL	50			59	44	23	25	29	16
16	0	UNL	50			60	46	28	30	29	20
19	0	UNL	15			52	46	39	61	29	14
22	0	UNL	15			51	45	39	64	29	10
					DAY 19						
01	0	UNL	15			52	42	28	40	33	8
04	0	UNL	15			49	40	26	41	36	8
07	0	UNL	50			54	42	26	34	35	16
10	0	UNL	50			60	45	27	28	35	14
13	0	UNL	50			65	48	26	23	35	10
16	0	UNL	30			61	47	30	31	29	19
19	0	UNL	15			51	46	41	69	27	16
22	0	UNL	15			48	45	42	80	30	7
					DAY 20						
01	0	UNL	15			47	45	42	83	29	6
04	0	UNL	15			44	42	40	86	21	6
07	0	UNL	8			49	46	43	80	24	3
10	0	UNL	10			56	50	44	64	31	11
13	5	UNL	10			59	51	44	58	30	17
16	0	UNL	12			56	50	44	64	28	15
19	6	9	8			49	46	43	80	27	13
22	10	12	15			51	47	44	77	28	13
					DAY 21						
01	10	12	15			50	47	45	83	26	9
04	10	13	15			49	47	45	86	24	7
07	3	UNL	9			51	48	45	80	28	13
10	0	UNL	10			58	52	46	65	34	7
13	0	UNL	12			62	54	46	56	27	12
16	0	UNL	15			60	53	47	62	25	15
19	0	UNL	12			53	49	45	74	27	18
22	0	UNL	15			51	47	43	74	27	12
					DAY 22						
01	0	UNL	15			48	46	44	86	27	15
04	0	UNL	15			48	46	44	86	29	8
07	0	UNL	9			49	46	44	83	00	0
10	10	250	10			58	52	46	65	07	5
13	10	UNL	12			67	56	47	49	29	12
16	10	200	15			60	52	46	56	28	16
19	7	UNL	15			51	47	43	74	28	16
22	0	UNL	15			49	46	44	83	26	12
					DAY 23						
01	4	UNL	15			48	46	43	83	26	4
04	7	UNL	15			46	44	42	86	28	6
07	5	UNL	12			49	45	40	71	00	0
10	1	UNL	15			58	51	44	60	32	10
13	6	250	30			64	50	35	34	23	11
16	5	UNL	30			59	50	42	54	20	12
19	10	UNL	30			55	49	44	67	22	14
22	10	33	15		R	55	51	48	77	16	8
					DAY 24						
01	10	25	12		R	53	52	51	93	18	7
04	6	40	12			51	50	49	93	29	10
07	0	UNL	15			51	49	47	86	29	5
10	1	UNL	30			58	51	45	62	29	12
13	2	UNL	30			60	53	46	60	27	12
16	3	UNL	30			59	51	44	58	30	14
19	0	UNL	15			53	49	45	74	29	17
22	0	UNL	15			51	47	43	74	29	18
					DAY 25						
01	0	UNL	15			49	45	41	74	28	7
04	0	UNL	15			47	45	42	83	27	6
07	2	UNL	30			51	47	42	71	30	4
10	1	UNL	30			57	49	42	57	04	5
13	9	UNL	30			62	51	41	46	28	13
16	4	UNL	30			60	50	41	50	29	18
19	8	UNL	15			53	48	44	72	27	17
22	2	UNL	12			51	48	45	80	28	8
					DAY 26						
01	0	UNL	12			50	47	43	77	00	0
04	0	UNL	15			47	45	42	83	00	0
07	0	UNL	30			55	50	46	72	00	0
10	0	UNL	30			69	55	42	38	14	4
13	0	UNL	30			75	55	37	25	05	3
16	0	UNL	30			71	54	37	29	29	15
19	0	UNL	30			65	50	35	33	29	14
22	0	UNL	15			61	49	36	39	25	5
					DAY 27						
01	0	UNL	15			58	49	39	49	00	0
04	0	UNL	15			55	48	41	59	00	0
07	0	UNL	15			58	51	44	60	00	0
10	0	UNL	7			68	57	49	51	04	6
13	0	UNL	15			74	56	44	34	30	17
16	0	UNL	12			59	54	49	70	29	15
19	10	8	8			51	49	47	86	26	20
22	0	UNL	15			51	48	45	80	26	18
					DAY 28						
01	1	UNL	15			51	48	46	83	27	22
04	5	UNL	15			48	46	44	86	28	19
07	0	UNL	10			51	47	42	71	29	15
10	0	UNL	20			57	47	36	46	29	18
13	0	UNL	30			57	47	37	47	29	24
16	0	UNL	20			55	46	36	49	29	25
19	0	UNL	15			50	44	38	64	28	18
22	0	UNL	15			49	44	38	66	29	12
					DAY 29						
01	0	UNL	15			48	44	39	71	28	7
04	0	UNL	15			48	43	38	68	27	7
07	0	UNL	50			49	40	28	44	29	4
10	0	UNL	50			58	43	23	26	35	12
13	0	UNL	50			63	48	32	31	29	12
16	0	UNL	50			59	49	39	48	27	17
19	6	UNL	20			54	47	40	59	29	15
22	0	UNL	15			52	47	42	69	29	10
					DAY 30						
01	0	UNL	15			49	46	42	77	29	7
04	0	UNL	15			46	42	38	74	29	2
07	0	UNL	10			54	48	43	67	15	2
10	0	UNL	12			65	51	36	34	03	4
13	0	UNL	50			72	54	36	27	31	10
16	0	UNL	50			65	51	36	34	29	17
19	0	UNL	50			59	49	38	46	29	14
22	0	UNL	15			52	48	43	72	29	8

NOTES

CEILING COLUMN—

UNL indicates an unlimited ceiling.

WEATHER COLUMN—

*	Tornado
T	Thunderstorm
Q	Squall
R	Rain
RW	Rain showers
ZR	Freezing rain
L	Drizzle
ZL	Freezing drizzle
S	Snow
SP	Snow pellets
IC	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
IF	Ice fog
GF	Ground fog
BD	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS—

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, North Carolina 28801.

STATION: SAN FRANCISCO CALIF   YEAR & MONTH: 72 04

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

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LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

SAN FRANCISCO, CALIFORNIA
FEDERAL OFFICE BLDG.
APRIL 1972

Latitude 37 47' N Longitude 122 25' W Elevation (ground) 52 ft Standard time used PACIFIC WBAN #23272

Date 1	Temperature °F Maximum 2	Minimum 3	Average 4	Departure from normal 5	Average dew point 6	Degree days Base 65° Heating 7A	Cooling 7B	Weather types on dates of occurrence 1 Fog 2 Heavy fog X 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, Haze 9 Blowing snow 8	Snow ice pellets or ice on ground at 08AM In 9	Precipitation Water equivalent In 10	Snow ice pellets In 11	Avg station pressure In. Elev 155 feet m.s.l. 12	Wind Resultant direction 13	Resultant speed m.p.h. 14	Average speed m.p.h. 15	Fastest mile Speed m.p.h. 16	Direction 17	Sunshine Hours and tenths 18	Percent of possible 19	Sky cover Tenths Sunrise to sunset 20	Midnight to midnight 21	Date 22
1	63	51	57	2		8	0	DATA ARE NOT ENTERED IN THIS COLUMN BECAUSE RECORDS OF WEATHER TYPES MAY BE INCOMPLETE	0	0	0					17	W	8.3	66			1
2	68	50	59	4		6	0		0	0	0					18	W	6.4	50			2
3	64	49	57	1		8	0		0	0	0					18	W	7.6	60			3
4	67	54	61	5		4	0		0	T	0					15	SW	4.6	36			4
5	64	54	59	3		6	0		0	.06	0					22	SE	2.6	20			5
6	61	52	57	1		8	0		0	0	0					19	W	10.4	81			6
7	61	50	56	0		9	0		0	0	0					20	W	12.3	96			7
8	58	50	54	-2		11	0		0	0	0					18	W	11.8	91			8
9	54	48	51	-5		14	0		0	0	0					22	NW	12.9	99			9
10	60	49	55	-1		10	0		0	0	0					17	W	10.9	84			10
11	57	50	54	-2		11	0		0	.30	0					24	SW	7.6	58			11
12	56	46	51	-5		14	0		0	.44	0					26	SW	1.7	13			12
13	57	45*	51	-5		14	0		0	0	0					21	W	13.1	100			13
14	64	50	57	1		8	0		0	0	0					17	W	13.1	100			14
15	68	50	59	3		6	0		0	0	0					18	SW	12.8	97			15
16	56	49	53	-3		12	0		0	0	0					23	W	12.3	93			16
17	59	48	54	-2		11	0		0	0	0					22	W	13.3	100			17
18	64	46	55	-1		10	0		0	0	0					19	N	13.3	100			18
19	63	48	56	0		9	0		0	0	0					22	W	13.3	100			19
20	55	47	51*	-5		14	0		0	0	0					24	SW	11.6	87			20
21	62	47	55	-1		10	0		0	0	0					17	SW	13.4	100			21
22	63	48	56	0		9	0		0	0	0					20	W	13.5	100			22
23	56	47	52	-4		13	0		0	.16	0					18	SW	12.7	95			23
24	58	50	54	-2		11	0		0	.11	0					23	W	13.5	100			24
25	59	50	55	-1		10	0		0	0	0					20	W	13.6	100			25
26	75*	53	64*	8		1	0		0	0	0					17	W	13.6	100			26
27	73	50	62	6		3	0		0	0	0					33	W	13.0	96			27
28	56	48	52	-4		13	0		0	0	0					23	W	13.7	100			28
29	61	48	55	-1		10	0		0	0	0					16	W	13.7	100			29
30	69	51	60	4		5	0		0	0	0					20	W	13.7	100			30
	Sum 1851	Sum 1478				Total 278	Total 0			Total 1.07	Total 0	For the month				33	W	Total 334.3	% for month	Sum	Sum	
	Avg 61.7	Avg 49.3	Avg 55.5	Dep -0.2	Avg	Dep -1	Dep			Dep -0.37						Date 27		Possible 395.5	85	Avg	Avg	

Number of days				Season to date	
Maximum Temp ≥ 90° ‡	Maximum Temp ≤ 32°	Minimum Temp ≤ 32°	Minimum Temp ≤ 0°	Total	Total
0	0	0	0	2799	3
				Dep	Dep
				217	

Number of days	
Precipitation ≥ .01 inch	5
Snow, ice pellets ≥ 1.0 inch	0
Thunderstorms	
Heavy fog X	
Clear	
Partly cloudy	
Cloudy	

Greatest in 24 hours and dates			
Precipitation		Snow, ice pellets	
.45	11-12	0	

Greatest depth on ground of snow, ice pellets or ice and date	
0	

HOURLY PRECIPITATION (Water equivalent in inches) — TRACE AMOUNT ENTRIES MAY BE INCOMPLETE.

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4		T	T	T	T											T	T								4
5								T	.01	.02	T												.01	.02	5
6																									6
7																									7
8																									8
9																									9
10																									10
11	.01	.07	.11	.04	T	.01	.01	T	.04	T											.01				11
12							.04	.01	.02	.21	.12			.01	.03	T	T								12
13																									13
14																									14
15																									15
16																									16
17																									17
18																									18
19																									19
20																									20
21																									21
22																									22
23																							.04	.12	23
24	.08	.01	.02																						24
25																									25
26																									26
27																									27
28																									28
29																									29
30																									30

*	Extreme temperatures for the month. May be the last of more than one occurrence.
–	Below zero temperature or negative departure from normal.
‡	≥ 70° at Alaskan stations.
•	Also on an earlier date, or dates.
X	Heavy fog restricts visibility to ¼ mile or less.
T	In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.

Data in columns 6, 12, 13, 14, and 18 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	AVERAGES Sky cover Tenths	Station pressure In.	Temperature Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind Direction	Speed m.p.h.

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

OAKLAND, CALIFORNIA
INTERNATIONAL AIRPORT
APRIL 1972

Latitude 37 44 N Longitude 122 12' W Elevation (ground) 6 ft Standard time used PACIFIC WBAN #23230

Date	Temperature °F: Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65°: Heating	Cooling	Weather types on dates of occurrence	Snow, ice pellets or ice on ground at 04AM In	Precipitation: Water equivalent In	Snow, ice pellets In	Avg station pressure In. Elev 7 feet m.s.l.	Wind: Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Sunshine: Hours and tenths	Percent of possible	Sky cover Tenths: Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	62	53	58	3	48	7	0		0	T	0	30.13	29	3.9	6.3	14	28			7	8	1
2	64	53	59	4	54	6	0	1	0	T	0	30.07	28	6.0	7.8	14	30			6	8	2
3	64	52	58	3	53	7	0	1 8	0	0	0	30.00	30	4.8	7.9	13	29			9	10	3
4	67	54	61	6	54	4	0		0	T	0	29.95	28	1.4	5.5	16	18			10	10	4
5	65	57	61	6	53	4	0	1	0	.25	0	29.88	16	12.8	14.1	26	16			9	9	5
6	62	50	56	0	50	9	0		0	.09	0	30.12	26	6.8	9.5	17	28			5	5	6
7	63	47	55	-1	45	10	0		0	0	0	30.19	28	7.3	8.9	20	26			8	4	7
8	62	49	56	0	45	9	0		0	0	0	30.19	28	8.9	11.9	18	29			9	7	8
9	59	46	53	-3	40	12	0		0	0	0	30.08	29	10.8	12.7	20	27			9	8	9
10	61	51	56	0	43	9	0		0	T	0	30.00	27	7.8	9.1	17	27			8	8	10
11	58	52	55	-1	47	10	0		0	.29	0	29.96	18	8.5	16.0	25	23			9	9	11
12	58	47	53	-3	46	12	0		0	.12	0	30.02	23	9.6	16.7	22	22			10	8	12
13	59	43*	51*	-5	38	14	0		0	0	0	30.10	31	11.8	13.4	18	30			0	0	13
14	66	46	56	-1	44	9	0		0	0	0	30.07	30	7.0	8.5	16	27			0	0	14
15	70	47	59	2	47	6	0		0	0	0	30.06	31	5.1	8.6	14	32			7	5	15
16	61	51	56	-1	48	9	0		0	0	0	30.08	25	7.9	10.1	21	25			6	5	16
17	61	45	53	-4	42	12	0		0	0	0	30.02	30	7.2	9.5	20	27			5	3	17
18	68	45	57	0	28	8	0		0	0	0	29.97	34	14.0	14.7	29	35			0	0	18
19	68	48	58	1	35	7	0		0	0	0	30.08	31	10.6	11.8	22	35			0	0	19
20	60	47	54	-3	46	11	0		0	0	0	30.24	27	9.7	10.5	18	31			2	3	20
21	63	51	57	0	49	8	0		0	0	0	30.22	24	8.6	8.8	16	27			2	3	21
22	67	48	58	0	47	7	0		0	0	0	30.06	[illegible]	6.8	8.2	13	26			7	4	22
23	62	47	55	-3	45	10	0		0	T	0	30.05	24	8.4	10.1	23	23			4	5	23
24	61	51	56	-2	48	9	0		0	.21	0	30.15	27	10.1	12.7	21	27			1	2	24
25	64	47	56	-2	44	9	0		0	0	0	30.14	29	7.4	9.4	18	26			3	2	25
26	74	49	62	4	50	3	0		0	0	0	29.99	[illegible]	3.1	5.9	13	31			0	0	26
27	74*	53	64*	6	49	1	0		0	0	0	29.98	27	7.4	10.6	20	27			1	1	27
28	62	49	56	-2	43	9	0		0	0	0	30.12	29	12.6	13.2	17	28			0	0	28
29	66	46	56	-2	37	9	0		0	0	0	30.13	31	11.1	12.5	17	29			1	0	29
30	71	47	59	1	46	6	0		0	0	0	30.07	28	3.6	7.2	15	30			0	0	30
	Sum	Sum				Total	Total			Total	Total	For the month:						Total	% for month	Sum	Sum	
	1922	1471				246	0	Number of days		.96	0	30.07	28	6.3	10.4	29	35			138	127	
	Avg.	Avg.	Avg.	Dep.	Avg.	Dep.	Dep.	Precipitation		Dep.						Date:	18	Possible		Avg.	Avg.	
	64.1	49.0	56.6	0.0	45	-9		≥ .01 inch	5	-0.42										4.6	4.2	

Number of days				Season to date	
Maximum Temp.		Minimum Temp.		Total	Total
≥ 90° ‡	≤ 32°	≤ 32°	≤ 0°	2698	3
0	0	0	0	Dep.	Dep.
				98	

Snow, ice pellets ≥ 1.0 inch 0
Thunderstorms 0
Heavy fog X 0
Clear 13 Partly cloudy 8 Cloudy 9

Greatest in 24 hours and dates: Precipitation		Snow, ice pellets		Greatest depth on ground of snow, ice pellets or ice and date
.34	5- 6	0		0

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1		T	T																						1
2								T	T																2
3																									3
4	T															T									4
5								T	.03	T	T	T	.06	.02	T									.14	5
6	.03	.03	T	.01		.02																			6
7																									7
8																									8
9																									9
10																							T	T	10
11	T	.01	.01	.03	.01	T	T	T	.12	.06	.04	T	T					T	T	.01	T				11
12						T	T	.01	.01	.01		T	T	T	.06	.03	T	T							12
13																									13
14																									14
15																									15
16																									16
17																									17
18																									18
19																									19
20																									20
21																									21
22																									22
23																								T	23
24	.06	.06	.09	T																					24
25																									25
26																									26
27																									27
28																									28
29																									29
30																									30

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
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William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	AVERAGES: Sky cover Tenths	Station pressure In.	Temperature: Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind: Direction	Speed m.p.h.
01	4	30.07	53	49	45	76	9.2	29	3.5
04	4	30.06	51	48	45	80	7.8	30	.9
07	5	30.08	53	48	44	74	8.2	30	2.0
10	5	30.10	58	51	45	63	9.7	25	5.6
13	5	30.08	62	53	45	56	12.0	27	9.9
16	4	30.05	62	54	46	60	14.9	28	12.8
19	4	30.04	58	52	47	68	11.7	28	10.2
22	3	30.07	55	51	46	73	9.7	30	6.6

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER Tenths	CEILING Hnds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL HUM %	WIND DIR	WIND SPEED Knots	SKY COVER Tenths	CEILING Hnds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL HUM %	WIND DIR	WIND SPEED Knots	SKY COVER Tenths	CEILING Hnds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL HUM %	WIND DIR	WIND SPEED Knots
					DAY 01											DAY 02											DAY 03						
01	10	100	10			54	51	49	83	01	4	10	5	12			55	54	53	93	29	8	10	3	6		F	53	52	51	93	29	8
04	10	100	10			54	51	49	83	13	5	10	5	12			54	53	53	96	34	5	10	3	5		F	54	53	52	93	11	7
07	10	60	12			55	52	49	80	04	3	10	4	4		F	54	53	53	96	24	3	10	7	5		F	54	53	53	96	33	6
10	10	120	12			57	52	47	69	28	7	10	9	5		F	59	56	54	84	17	6	10	10	5		KH	57	55	53	87	18	6
13	10	120	15			60	52	44	56	28	4	6	UNL	12			62	57	54	75	24	7	9	250	10			63	57	53	70	28	8
16	7	100	20			62	53	45	54	29	7	2	UNL	15			61	58	55	81	27	8	10	250	20			60	57	54	81	30	10
19	2	UNL	20			58	54	50	75	29	8	3	UNL	15			57	55	54	90	30	10	10	200	15			57	55	53	87	31	8
22	1	UNL	15			56	53	50	80	28	6	10	3	6		F	54	53	53	96	31	9	10	120	15			57	55	53	87	32	6
					DAY 04											DAY 05											DAY 06						
01	10	14	12			57	55	53	87	30	5	10	60	15			64	58	54	70	15	14	10	11	6		R	57	55	53	87	17	10
04	10	13	15			58	56	54	87	00	0	10	50	15			64	58	53	68	16	10	10	28	12			57	55	53	87	24	4
07	10	11	15			58	56	54	87	34	5	10	90	20			63	57	53	70	15	16	10	60	12			57	55	53	87	24	6
10	10	170	9			62	59	57	84	24	4	10	50	12		R	61	56	53	75	16	17	5	UNL	15			59	55	52	78	28	6
13	10	140	10			64	59	55	73	26	6	10	25	6		R	59	56	54	84	18	14	7	50	30			60	55	51	72	28	11
16	10	80	20			66	59	53	63	10	7	9	25	20			60	57	54	81	11	7	2	UNL	35			60	52	44	56	27	12
19	10	70	15			63	57	53	70	36	5	7	110	30			60	57	54	81	21	11	0	UNL	30			57	51	46	67	26	12
22	10	100	15			63	56	51	65	19	6	10	28	15			60	56	52	75	19	9	0	UNL	15			54	50	46	75	01	5
					DAY 07											DAY 08											DAY 09						
01	0	UNL	15			50	47	45	83	09	5	0	UNL	15			53	47	40	62	30	11	7	UNL	15			52	45	36	55	33	13
04	0	UNL	15			47	45	44	89	00	0	0	UNL	15			52	48	45	77	29	10	0	UNL	15			48	43	37	66	34	9
07	6	UNL	15			51	48	45	80	00	0	2	UNL	12			52	48	45	77	10	4	6	UNL	25			50	43	35	57	33	10
10	9	UNL	12			58	53	48	70	29	8	8	UNL	12			56	51	46	69	18	7	10	UNL	35			54	46	37	53	22	4
13	10	UNL	15			62	54	47	58	29	11	10	UNL	12			59	53	47	65	24	6	10	UNL	35			58	49	40	51	27	9
16	10	UNL	25			61	52	44	54	26	17	10	UNL	12			60	54	49	67	27	15	10	250	30			57	50	44	62	27	17
19	2	UNL	20			58	50	45	67	27	11	10	250	15			57	52	47	69	27	15	10	250	25			54	49	44	69	28	14
22	0	UNL	15			54	49	45	72	29	10	10	250	15			55	49	43	64	31	15	10	250	15			53	48	43	69	28	12
					DAY 10											DAY 11											DAY 12						
01	7	UNL	15			52	48	44	74	27	15	10	50	15		R	54	49	45	72	10	9	5	UNL	15			53	49	45	74	19	9
04	7	250	15			51	47	43	74	27	10	10	30	12		R	53	49	45	74	13	19	8	34	15			53	48	46	72	16	14
07	9	250	20			52	48	43	72	26	7	10	25	12		RW	53	50	47	80	14	17	10	30	10		RW	53	49	45	74	18	14
10	7	UNL	25			56	49	43	62	17	6	9	38	15		RW	55	51	48	77	18	18	10	25	15			53	50	47	80	19	19
13	8	UNL	35			58	50	41	53	30	6	4	UNL	20			58	54	50	75	25	15	10	30	15			57	53	50	78	23	13
16	10	250	30			61	52	43	52	27	7	7	35	20			56	52	48	75	27	14	10	15	6		RW	54	52	50	86	28	16
19	7	250	25			55	50	45	69	28	7	9	50	25			54	50	47	77	27	10	10	17	12			53	49	46	77	29	16
22	10	90	15			55	50	45	69	30	5	7	60	15			53	49	46	77	18	9	1	UNL	15			50	45	39	66	32	15
					DAY 13											DAY 14											DAY 15						
01	0	UNL	15			48	42	35	61	32	14	0	UNL	15			51	47	43	74	33	10	0	UNL	12			52	50	48	86	32	5
04	0	UNL	15			44	40	35	71	36	11	0	UNL	15			49	45	40	71	04	4	0	UNL	10			50	48	46	86	10	4
07	0	UNL	30			45	41	35	68	35	12	0	UNL	40			50	45	40	69	36	3	0	UNL	15			52	48	45	77	08	4
10	2	UNL	40			53	45	36	53	29	9	0	UNL	40			61	51	41	48	29	8	8	UNL	15			61	54	47	60	23	8
13	0	UNL	40			59	48	37	44	30	15	0	UNL	40			64	54	44	48	28	10	10	UNL	30			70	56	43	38	27	6
16	0	UNL	40			59	50	42	54	28	15	0	UNL	40			65	54	45	49	28	13	7	UNL	20			65	58	53	65	29	11
19	0	UNL	40			56	49	43	62	29	10	0	UNL	40			60	53	47	62	26	6	5	UNL	20			59	53	48	67	32	12
22	0	UNL	15			52	47	42	69	34	7	0	UNL	15			55	51	48	77	31	5	5	UNL	15			53	51	49	86	34	10
					DAY 16											DAY 17											DAY 18						
01	5	UNL	12			52	50	49	90	30	6	0	UNL	15			50	48	46	86	06	4	0	UNL	15			48	44	39	71	35	5
04	10	11	12			52	50	48	86	27	4	0	UNL	15			47	45	44	89	00	0	0	UNL	15			45	41	37	74	34	6
07	10	11	12			53	51	49	86	23	8	6	UNL	15			49	44	38	66	01	5	0	UNL	40			50	40	27	41	34	11
10	10	UNL	12			58	53	49	72	24	7	9	UNL	15			58	49	39	49	29	8	0	UNL	35			59	42	17	19	34	18
13	6	UNL	15			60	54	49	67	25	13	6	UNL	20			61	52	43	52	28	14	0	UNL	35			66	45	14	13	01	18
16	2	UNL	15			59	53	47	65	26	16	4	UNL	20			60	52	44	56	27	15	0	UNL	35			67	46	15	13	35	22
19	1	UNL	12			55	50	46	72	24	10	0	UNL	12			56	49	42	60	27	9	0	UNL	35			60	51	42	52	30	10
22	0	UNL	12			53	49	46	77	09	6	0	UNL	12			51	45	39	64	34	11	0	UNL	15			56	47	36	47	34	12
					DAY 19											DAY 20											DAY 21						
01	0	UNL	15			52	44	34	50	32	9	0	UNL	15			51	48	46	83	23	9	10	11	12			51	49	47	86	24	10
04	0	UNL	15			48	42	35	61	32	5	0	UNL	12			50	47	45	83	25	10	10	11	12			51	49	47	86	23	6
07	0	UNL	40			53	41	25	34	34	10	1	UNL	10			50	47	45	83	25	8	10	13	12			51	49	47	86	23	7
10	0	UNL	40			62	46	24	23	35	11	0	UNL	12			55	50	46	72	28	5	1	UNL	15			56	52	48	75	22	6
13	0	UNL	40			65	50	34	32	29	13	7	UNL	12			58	52	47	67	29	10	0	UNL	15			61	54	49	65	24	9
16	0	UNL	30			63	51	38	40	29	16	3	UNL	10			57	52	47	69	29	12	0	UNL	15			63	56	50	63	26	11
19	0	UNL	30			58	49	40	51	29	11	0	UNL	8			52	49	46	80	29	9	0	UNL	15			58	54	51	78	25	12
22	0	UNL	15			52	49	46	80	27	7	8	13	12			52	49	47	83	25	10	0	UNL	15			57	53	50	78	00	0
					DAY 22											DAY 23											DAY 24						
01	0	UNL	15			53	50	48	83	29	5	5	UNL	15			51	48	46	83	24	5	10	15	10		R	55	53	51	86	18	10
04	0	UNL	15			50	47	45	83	08	4	7	250	15			50	47	45	83	28	5	10	10	10			54	53	52	93	28	10
07	0	UNL	10			51	49	47	86	24	6	3	UNL	25			50	47	44	80	31	5	1	UNL	25			52	49	47	83	32	9
10	10	UNL	10			56	51	47	72	26	4	2	UNL	20			55	49	44	67	29	5	1	UNL	30			57	52	47	69	23	6
13	7	UNL	10			66	56	48	52	29	8	4	UNL	25			62	53	44	52	28	9	2	UNL	30			61	54	48	63	26	14
16	10	250	15			63	55	48	58	29	10	2	UNL	30			60	52	45	58	23	17	2	UNL	30			60	53	47	62	27	18
19	8	UNL	15			56	51	47	72	27	10	8	240	20			56	52	46	65	20	8	0	UNL	30			56	50	45	67	30	13
22	0	UNL	15			51	49	47	86	28	10	10	43	15			58	53	49	72	22	16	0	UNL	15			53	48	44	72	30	8
					DAY 25											DAY 26											DAY 27						
01	0	UNL	15			51	47	42	71	34	5	0	UNL	15			53	50	48	83	00	0	0	UNL	15			60	53	47	62	13	8
04	0	UNL	15			47	44	40	77	34	7	0	UNL	12			50	48	46	86	04	4	0	UNL	15			55	50	45	69	06	4
07	1	UNL	30			51	46	41	69	01	7	0	UNL	30			57	52	48	72	17	3	0	UNL	20			60	53	47	62	00	0
10	2	UNL	20			58	50	43	58	29	9	0	UNL	25			64	58	53	68	24	6	0	UNL	10			65	57	50	59	28	7
13	6	UNL	20			63	53	43	48	29	12	0	UNL	30			69	59	51	53	23	7	0	UNL	12			72	60	52	50	29	9
16	0	UNL	25			62	53	45	54	27	14	0	UNL	20			70	61	55	59	26	8	0	UNL	15			63	57	52	68	27	17
19	4	UNL	20			58	53	48	70	25	11	0	UNL	15			67	55	45	45	34	8	8	9	9			54	52	50	86	26	16
22	0	UNL	15			57	52	48	72	00	0	0	UNL	15			62	55	50	65	32	5	1	UNL	15			54	51	49	83	27	13
					DAY 28											DAY 29											DAY 30						
01	0	UNL	15			55	51	47	75	27	12	0	UNL	15			50	42	33	52	35	11	0	UNL	15			53	49	45	74	00	0
04	2	UNL	15			52	50	48	86	29	8	0	UNL	15			47	41	33	58	35	10	0	UNL	15			51	47	44	77	13	8
07	0	UNL	15			53	49	46	77	29	10	0	UNL	40			49	42	33	54	34	12	0	UNL	40			55	49	44	67	12	4
10	0	UNL	25			58	50	42	55	26	10	0	UNL	40			58	45	30	35	30	15	0	UNL	30			61	54	47	60	27	7
13	0	UNL	25			60	50	41	50	28	15	0	UNL	40			64	49	32	30	30	10	0	UNL	30			71	55	41	34	30	10
16	0	UNL	20			61	52	43	52	29	12	0	UNL	40			63	53	44	50	28	14	0	UNL	35			68	57	49	51	28	11
19	0	UNL	20			57	49	41	55	29	11	5	UNL	30			61	53	46	58	28	7	0	UNL	35			65	54	44	47	32	5
22	0	UNL	15			54	46	37	53	32	14	0	UNL	12			57	52	47	69	31	8	0	UNL	15			60	55	50	70	29	5

NOTES

*

CEILING COLUMN–

UNL indicates an unlimited ceiling.

WEATHER COLUMN–

*	Tornado
T	Thunderstorm
Q	Squall
R	Rain
RW	Rain showers
ZR	Freezing rain
L	Drizzle
ZL	Freezing drizzle
S	Snow
SP	Snow pellets
IC	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
IF	Ice fog
GF	Ground fog
BD	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS–

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, North Carolina 28801.

STATION: OAKLAND CALIFORNIA YEAR & MONTH: 72 04

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

POSTAGE AND FEES PAID
U S DEPARTMENT OF COMMERCE

SAN JOSE WEATHER STATION
DEPARTMENT OF CIVIL DEFENSE - CITY OF SAN JOSE
MONTHLY METEOROLOGICAL SUMMARY
120th MERIDIAN TIME

SAN JOSE, CALIFORNIA (CO-OPERATIVE STATION OF THE NATIONAL WEATHER SERVICE) APRIL 1972

LATITUDE 37° 20' N. LONGITUDE 12° 53' W. ELEVATION (GROUND) 67 ft. PACIFIC STANDARD TIME USED

DATE	TEMPERATURES (F)					ATMOSPHERIC PRESSURE AT 4:00 PM PST	MOISTURE			WIND			
	EXTREMES		AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS - BASE 65°		DEWPOINT AT 4:00 PM PST	RELATIVE HUMIDITY AT 4:00 PM PST	* PRECIPITATION (INCHES AND HUNDREDTHS) MIDNIGHT TO MIDNIGHT	* DAILY PREVAILING WIND DIRECTION	* AVERAGE SPEED	FASTEST MILE	
	MAXIMUM	MINIMUM										* DIRECTION	* SPEED (MPH)
1	67	53	60	+ 4	5	30.03	45	45	T	NW	4.7	NW	14
2	71	50	61	+ 4	4	29.96	58	67	.00	NW	4.8	NW	13
3	75	54	65	+ 8	0	29.90	54	58	.00	NW	5.0	NW	16
4	74	55	65	+ 8	0	29.86	47	44	T	SW	6.1	SW	20
5	70	57	64	+ 7	1	29.98	54	83	.09	S	7.0	SE	13
6	65	52	59	+ 2	6	30.12	41	43	.05	NW	5.8	N	13
7	66	39	53	- 4	12	30.10	43	47	T	NW	6.5	NW	16
8	65	41	54	- 3	11	30.14	43	47	.00	NW	7.1	NW	16
9	64	42	53	- 4	12	29.98	39	46	.00	NW	6.8	NW	16
10	66	46	56	- 1	9	29.88	46	51	.00	S	4.7	NW	13
11	64	49	57	0	8	29.96	46	59	.09	SE	7.3	SE	15
12	60	47	54	- 4	11	29.94	53	88	.11	S	7.3	W	16
13	62	39	51	- 7	14	30.04	39	44	.00	NW	7.7	W	16
14	72	40	56	- 2	9	29.99	43	37	.00	NW	5.6	N	15
15	78	45	62	+ 4	3	29.99	54	50	.00	NW	5.0	N	12
16	75	48	62	+ 4	3	30.00	48	63	.00	N	5.0	N	20
17	67	41	54	- 4	11	29.94	36	37	.00	NW	6.8	N	17
18	66	40	53	- 5	12	29.90	27	24	.00	NW	9.8	NW	20
19	63	46	57	- 1	8	30.04	28	22	.00	N	8.2	N	16
20	68	38	53	- 5	12	30.16	29	52	.00	NW	5.6	NW	16
21	70	42	56	- 2	9	30.13	52	58	.00	NW	5.8	N	16
22	75	44	60	+ 1	5	29.94	50	51	.00	NW	5.4	NW	13
23	71	44	58	- 1	7	29.96	42	38	.00	N	5.3	N	13
24	68	50	59	0	6	30.12	51	64	.17	NW	9.9	NW	20
25	69	45	57	- 2	8	30.05	42	38	.00	NW	7.5	NW	16
26	82	45	64	+ 5	1	29.86	42	25	.00	NW	5.2	NW	12
27	86	50	68	+ 9	0	29.90	48	34	.00	N	6.3	NW	20
28	80	49	65	+ 5	0	30.08	30	40	.00	NW	8.9	NW	18
29	69	45	57	- 3	8	30.03	37	32	.00	NW	9.2	NW	17
30	78	44	61	+ 1	4	29.97	41	28	.00	NW	5.7	NW	16
SUM/MEAN	70	46	58	0	(199)	30.00	44	47	(.51)	NW	6.5	SW	20
NORMALS	69	47	58	---	(216)	30.03	--	54	(1.05)	NW	6.6	--	--

ALL DATA EXCEPT ASTERISK (*) ARE FOR THE 24-HOUR PERIOD
ENDING AT 4:00 PM PST - - - - - ( ) INDICATES SUM TOTAL

ATMOSPHERIC PRESSURE

HIGHEST . . . . 30.16; DATE 20
LOWEST . . . . 29.86; DATE 4*

TEMPERATURE

HIGHEST . . . . 85; DATE 27
LOWEST . . . . 38; DATE 20
GREATEST DAILY RANGE . 37; DATE 26
LOWEST DAILY RANGE . . 13; DATE 5*

HEATING DEGREE DAYS (BASE 65°)

TOTAL THIS MONTH 199
DEPARTURE FROM NORMAL . . . . - 17
SEASONAL TOTAL SINCE JULY 1 2488
SEASONAL DEPARTURE FROM NORMAL +223

RAINFALL

GREATEST FALL THIS MONTH IN - - -
5 MINUTES . . . . . .05; DATE 5
10 MINUTES . . . . . .06; DATE 5
15 MINUTES . . . . . .06; DATE 5
30 MINUTES . . . . . .07; DATE 5
1 HOUR . . . . . . .09; DATE 24
2 HOURS . . . . . . .11; DATE 24
24 HOURS . . . . . . .17; DATE 24

SEASONAL TOTAL ON APRIL 30, 1971
SINCE JULY 1, 1971;
THIS YEAR . . . 6.24
LAST YEAR . . . 14.72
DEFICIENCY OR EXCESS THIS MONTH AS
COMPARED WITH NORMAL . . . . -.55
ACCUMULATED EXCESS OR DEFICIENCY ON
APRIL 30, 1972 SINCE JULY 1, 1971
. . . . -6.26

WIND

TOTAL MOVEMENT (MILES) . . 4689
AVERAGE HOURLY VELOCITY . 6.5
PREVAILING DIRECTION . . . NW
FASTEST MILE THIS MONTH 20
DIRECTION SW; DATE 4*

PRECIPITATION

DAYS WITH - - - - - - - -
.01 INCH OR MORE OF RAIN 5
.10 INCH OR MORE OF RAIN 2
.25 INCH OR MORE OF RAIN 0

MISCELLANEOUS PHENOMENA

DAYS WITH - - - - - - - - -
FOG 0
THUNDERSTORMS 0

COMPARATIVE DATA FOR THIS MONTH FROM THE RECORDS OF PREVIOUS YEARS

TEMPERATURES

HIGHEST THIS MONTH - 92; DATE 24, 1966
LOWEST THIS MONTH - 30; DATE 7, 1908

PRECIPITATION

GREATEST FALL THIS MONTH - -
5 MINUTES . . . .18; DATE 9, 1941
10 MINUTES . . . .24; DATE 4, 1941
15 MINUTES . . . .29; DATE 4, 1941
30 MINUTES . . . .35; DATE 4, 1941
1 HOUR . . . . .41; DATE 3, 1935
2 HOURS . . . . .56; DATE 3, 1935
24 HOURS . . . . 1.34; DATE 4, 1941

WIND

AVERAGE HOURLY VELOCITY (MILES) 6.6
PREVAILING DIRECTION NW
MAXIMUM VELOCITY RECORDED FOR THIS MONTH SINCE 1908 - 36 MPH - NW - DATE 8, 1944
GREATEST AVERAGE VELOCITY FOR WHOLE MONTH - 8.8 - DATE 1921.

MEAN TEMPERATURE (T) TOTAL RAINFALL (R)

	T	R		T	R		T	R
1920	55	.92	1937	56	.74	1954	61	.39
1921	55	.40	1938	56	1.12	1955	53	1.12
1922	53	.32	1939	59	.45	1956	57	1.01
1923	56	1.52	1940	59	.47	1957	59	.94
1924	58	.38	1941	57	3.20	1958	58	3.68
1925	57	1.55	1942	57	2.79	1959	62	.60
1926	62	2.88	1943	58	1.13	1960	59	.80
1927	56	1.03	1944	55	.90	1961	60	.76
1928	56	.96	1945	58	.22	1962	61	.10
1929	54	.92	1946	58	.01	1963	55	3.08
1930	59	.76	1947	61	.51	1964	60	.10
1931	60	.40	1948	56	3.19	1965	58	1.93
1932	56	.20	1949	59	T	1966	63	.37
1933	56	.15	1950	59	.75	1967	50	3.89
1934	60	.34	1951	57	.53	1968	59	.57
1935	58	3.38	1952	58	1.26	1969	57	1.70
1936	59	.88	1953	56	.75	1970	55	.21
						1971	56	1.24
						1972	58	.51

PRECIPITATION

AVERAGE NUMBER OF DAYS THIS MONTH
WITH .01 INCH OR MORE OF RAIN 5
WITH .25 INCH OR MORE OF RAIN 2

GREATEST NUMBER OF DAYS THIS MONTH WITH .01 INCH OR MORE OF RAIN ---- 18 --- DATE - 1967

AVERAGE WEATHER TO BE EXPECTED IN MAY

DAILY SUNSHINE . . . . . 9.2 HOURS
DAYS CLEAR 16
CLOUDY 5
PARTLY CLOUDY 10
RAINFALL 43
AVERAGE DAYS WITH RAIN
.01 INCH OR MORE 3
HOURLY WIND VELOCITY 6.8
PREVAILING WIND DIRECTION . NW
AVERAGE: MAXIMUM TEMPERATURE 73
MINIMUM TEMPERATURE 50

T INDICATES TRACE

*AND OTHER DATES

( ) INDICATES ESTIMATED OR NOT AVAILABLE

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

SAN FRANCISCO, CALIFORNIA
INTERNATIONAL AIRPORT
JULY 1972

Latitude 37° 37' N Longitude 122° 23' W Elevation (ground) 8 ft Standard time used: PACIFIC WBAN #23234

Date	Temperature °F: Maximum	Temperature °F: Minimum	Temperature °F: Average	Temperature °F: Departure from normal	Temperature °F: Average dew point	Degree days Base 65°: Heating	Degree days Base 65°: Cooling	Weather types on dates of occurrence 1 Fog 2 Heavy fog X 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, Haze 9 Blowing snow	Snow, ice pellets or ice on ground at 04AM In	Precipitation: Water equivalent In	Precipitation: Snow, ice pellets In	Avg station pressure In. Elev. 18 feet m.s.l.	Wind: Resultant direction	Wind: Resultant speed m.p.h.	Wind: Average speed m.p.h.	Fastest mile: Speed m.p.h.	Fastest mile: Direction	Sunshine: Hours and tenths	Sunshine: Percent of possible	Sky cover Tenths: Sunrise to sunset	Sky cover Tenths: Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	78	56	67	5	55	0	2	8	0	0	0	29.82	22	.4	7.3	10	33			6	5	1
2	71	57	64	2	53	1	0		0	0	0	29.89	23	7.0	7.9	14	22			3	3	2
3	69	57	63	1	52	2	0		0	0	0	29.99	25	9.4	10.2	16	30			5	5	3
4	69	56	63	1	51	2	0		0	0	0	30.03	29	10.8	11.1	18	30			6	7	4
5	67	55	61	-1	50	4	0		0	0	0	30.02	28	12.5	12.8	18	28			3	5	5
6	63	54	59	-3	51	6	0		0	0	0	30.03	26	12.1	12.5	25	27			7	8	6
7	64	53	59*	-3	51	6	0		0	0	0	30.02	28	12.7	12.9	21	28			8	7	7
8	70	52*	61	-1	51	4	0		0	0	0	30.02	29	14.4	14.8	25	28			4	4	8
9	67	54	61	-1	48	4	0		0	0	0	30.00	28	15.7	16.1	24	28			0	2	9
10	67	54	61	-1	50	4	0		0	0	0	29.97	28	13.3	14.0	23	29			0	0	10
11	81	55	68	6	54	0	3		0	0	0	29.96	31	8.4	10.1	23	29			0	0	11
12	86	55	71	9	54	0	6		0	0	0	29.95	30	10.3	11.2	22	30			0	0	12
13	97	59	78	15	55	0	13		0	0	0	29.87	29	7.9	9.4	18	30			0	0	13
14	98*	60	79*	16	54	0	14		0	0	0	29.74	30	8.4	9.4	20	30			0	0	14
15	80	59	70	7	56	0	5		0	0	0	29.76	32	5.4	8.1	14	29			0	0	15
16	75	59	67	4	57	0	2		0	0	0	29.85	23	5.3	7.2	17	20			0	0	16
17	73	60	68	5	57	0	3		0	0	0	29.93	23	9.6	10.2	17	24			2	2	17
18	69	59	64	1	55	1	0		0	T	0	29.96	26	11.3	11.9	18	27			6	7	18
19	67	56	62	-1	52	3	0		0	T	0	29.90	25	10.1	10.5	17	24			9	9	19
20	69	57	63	0	54	2	0		0	T	0	29.87	22	10.1	10.4	16	22			9	10	20
21	70	58	64	1	53	1	0		0	0	0	29.98	24	7.6	9.2	16	28			7	6	21
22	67	56	62	-1	52	3	0		0	0	0	30.00	28	10.9	11.2	20	27			7	5	22
23	68	57	63	0	52	2	0		0	0	0	29.97	28	11.5	11.7	20	26			8	9	23
24	67	56	62	-2	52	3	0		0	0	0	29.94	27	13.9	14.4	22	27			4	5	24
25	68	56	62	-2	52	3	0		0	0	0	29.95	28	14.1	14.4	23	28			2	4	25
26	70	56	63	-1	52	2	0		0	0	0	29.99	29	9.9	11.4	20	30			3	4	26
27	78	54	66	2	54	0	1		0	0	0	29.97	30	10.4	11.5	25	28			0	0	27
28	70	54	62	-2	53	3	0		0	0	0	29.94	30	14.3	14.4	22	30			3	4	28
29	67	54	61	-3	53	4	0		0	T	0	29.92	30	12.1	12.8	22	30			5	5	29
30	68	57	63	-1	54	2	0		0	0	0	29.99	28	13.7	14.1	23	27			3	6	30
31	70	56	63	-1	53	2	0		0	0	0	30.07	29	14.2	14.7	23	30			3	4	31

Sum	Sum				Total	Total			Total	Total	For the month						Total	% for month	Sum	Sum
2245	1741				64	49	Number of days		T	0	29.94	28	9.8	11.5	25	28			113	126
Avg.	Avg.	Avg.	Dep.	Avg.	Dep.	Dep.	Precipitation		Dep.						Date:	27+	Possible		Avg.	Avg.
72.4	56.2	64.3	1.6	53	-17		≥ .01 inch	0	-0.01										3.6	4.1

Number of days				Season to date				Greatest in 24 hours and dates			Greatest depth on ground of snow, ice pellets or ice and date
Maximum Temp.		Minimum Temp.		Total	Total	Snow, ice pellets ≥ 1.0 inch	0	Precipitation		Snow, ice pellets	
≥ 90° ‡	≤ 32°	≤ 32°	≤ 0°	64	71	Thunderstorms	0				
2	0	0	0	Dep.	Dep.	Heavy fog X	0	T	29+	0	0
				-17		Clear 17	Partly cloudy 10	Cloudy 4			

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4																									4
5																									5
6																									6
7																									7
8																									8
9																									9
10																									10
11																									11
12																									12
13																									13
14																									14
15																									15
16																									16
17																									17
18																							T	T	18
19						T	T														T	T			19
20						T	T																		20
21																									21
22																									22
23																									23
24																									24
25																									25
26																									26
27																									27
28																									28
29								T	T																29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.

Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data $1.00 per year including annual summary if published. Single copy: 10 cents for monthly summary; 15 cents for annual summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	Averages: Sky cover Tenths	Averages: Station pressure In.	Temperature: Air °F	Temperature: Wet bulb °F	Temperature: Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind: Direction	Resultant wind: Speed m.p.h.
01	5	29.94	58	55	53	83	9.1	27	8.1
04	6	29.93	57	54	52	84	7.8	27	7.1
07	6	29.96	59	56	53	79	6.8	27	5.2
10	4	29.97	66	59	54	67	9.8	29	6.1
13	2	29.96	70	60	54	58	15.9	28	13.4
16	2	29.93	68	59	53	60	17.3	28	15.3
19	3	29.93	62	57	53	73	14.3	28	13.0
22	3	29.95	59	55	53	81	11.2	27	10.4

OBSERVATIONS AT 3-HOUR INTERVALS

DAY	HOUR	SKY COVER Tenths	CEILING Hnds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	WET BULB °F	DEW PT. °F	REL HUM %	WIND DIR	WIND SPEED Knots
DAY 01	01	9	UNL	10			59	56	53	81	29	8
	04	6	UNL	10			56	54	53	90	29	6
	07	8	UNL	7			60	57	54	81	09	2
	10	9	UNL	7			66	61	57	73	04	7
	13	0	UNL	12			73	63	57	57	04	6
	16	8	UNL	15			74	64	57	55	12	8
	19	3	UNL	15			66	59	54	65	20	9
	22	2	UNL	15			60	57	54	81	21	5
DAY 02	01	3	UNL	15			59	56	53	81	20	8
	04	3	UNL	15			57	54	52	83	32	4
	07	5	UNL	10			59	55	52	78	22	4
	10	0	UNL	12			66	59	53	63	22	6
	13	3	UNL	12			69	60	54	59	23	12
	16	1	UNL	20			68	59	53	59	22	11
	19	0	UNL	15			61	56	53	75	26	6
	22	1	UNL	15			59	56	53	81	23	4
DAY 03	01	10	19	15			59	55	52	78	22	9
	04	10	19	15			58	55	52	81	26	5
	07	10	19	10			60	56	52	75	22	6
	10	10	20	10			64	58	53	68	22	6
	13	2	UNL	12			67	59	53	61	28	12
	16	1	UNL	20			66	58	52	61	26	13
	19	0	UNL	20			61	56	52	72	27	11
	22	0	UNL	15			58	55	52	81	25	9
DAY 04	01	6	20	15			57	54	51	80	27	5
	04	10	14	15			57	54	51	80	27	8
	07	10	14	15			57	54	51	80	26	7
	10	0	UNL	15			64	57	51	63	30	8
	13	5	UNL	15			68	58	51	55	29	13
	16	5	UNL	20			65	57	51	61	29	15
	19	8	250	20			59	55	51	75	29	12
	22	9	250	15			57	53	50	78	30	9
DAY 05	01	4	UNL	15			55	52	49	80	28	7
	04	10	15	15			56	53	50	80	25	9
	07	10	15	15			56	52	49	78	26	8
	10	2	UNL	15			63	56	50	63	29	10
	13	0	UNL	20			66	57	50	57	29	14
	16	0	UNL	30			63	56	50	63	28	16
	19	0	UNL	30			58	54	50	75	28	13
	22	7	12	15			56	53	51	83	28	12
DAY 06	01	10	8	15			56	54	52	87	25	6
	04	10	6	15			55	53	52	90	21	6
	07	10	8	8			55	53	52	90	26	6
	10	10	9	9			56	54	52	87	27	10
	13	9	12	10			60	56	52	75	27	14
	16	3	UNL	12			60	55	51	72	27	20
	19	1	UNL	12			56	53	50	80	26	16
	22	7	17	12			56	53	50	80	27	9
DAY 07	01	10	12	15			56	53	51	83	26	10
	04	3	UNL	15			54	52	51	90	27	5
	07	7	11	8			56	53	50	80	30	5
	10	8	UNL	8			60	55	50	70	29	12
	13	10	UNL	20			61	55	51	70	27	16
	16	7	UNL	30			61	55	51	70	28	17
	19	7	UNL	30			58	54	50	75	28	18
	22	5	UNL	15			56	53	50	80	28	7
DAY 08	01	5	UNL	15			55	53	51	86	27	6
	04	5	UNL	15			52	50	49	90	29	5
	07	9	UNL	10			58	54	50	75	30	10
	10	5	UNL	30			64	56	50	61	31	13
	13	2	UNL	50			68	59	53	59	29	18
	16	0	UNL	50			65	59	54	68	28	20
	19	4	UNL	50			61	57	54	78	28	14
	22	3	UNL	15			57	53	50	78	27	17
DAY 09	01	6	UNL	15			56	52	49	78	28	14
	04	7	UNL	15			55	52	49	80	28	15
	07	0	UNL	10			58	54	50	75	31	8
	10	0	UNL	12			64	56	49	58	29	12
	13	0	UNL	25			66	56	48	52	28	18
	16	0	UNL	50			64	55	48	56	26	20
	19	0	UNL	50			60	53	47	62	28	15
	22	0	UNL	15			57	52	47	69	27	10
DAY 10	01	0	UNL	15			56	52	48	75	28	12
	04	0	UNL	15			55	51	48	77	29	10
	07	0	UNL	9			58	54	50	75	29	10
	10	0	UNL	10			66	57	50	57	30	12
	13	0	UNL	15			65	57	51	61	30	19
	16	0	UNL	25			64	57	51	63	28	14
	19	1	UNL	15			59	55	52	78	26	15
	22	0	UNL	15			57	54	52	83	23	5
DAY 11	01	0	UNL	15			56	53	51	83	30	3
	04	0	UNL	15			55	53	51	86	30	6
	07	0	UNL	10			60	56	52	75	02	3
	10	0	UNL	10			66	61	57	73	07	6
	13	0	UNL	10			75	64	56	52	31	13
	16	0	UNL	20			73	62	54	51	30	15
	19	0	UNL	30			63	58	54	73	30	14
	22	0	UNL	15			59	56	53	81	30	10
DAY 12	01	0	UNL	15			58	55	53	84	29	7
	04	0	UNL	15			56	54	53	90	29	7
	07	0	UNL	10			63	58	54	73	30	4
	10	0	UNL	8			74	64	57	55	03	6
	13	0	UNL	15			80	65	56	44	30	13
	16	0	UNL	30			76	63	55	48	30	18
	19	0	UNL	30			69	60	54	59	30	15
	22	0	UNL	15			62	57	53	73	29	8
DAY 13	01	0	UNL	15			61	56	53	75	28	7
	04	0	UNL	15			60	56	53	78	29	4
	07	0	UNL	9			67	61	56	68	28	3
	10	0	UNL	8			81	68	60	49	06	6
	13	0	UNL	12			92	70	57	31	29	13
	16	0	UNL	30			96	69	52	23	29	12
	19	0	UNL	30			78	63	53	42	30	10
	22	0	UNL	15			65	59	54	68	29	10
DAY 14	01	0	UNL	15			63	58	54	73	29	7
	04	0	UNL	15			61	56	53	75	30	5
	07	0	UNL	8			69	60	54	59	00	0
	10	0	UNL	8			86	67	55	35	03	6
	13	0	UNL	15			98	72	59	27	30	11
	16	0	UNL	30			95	69	53	24	29	13
	19	0	UNL	30			72	61	54	53	31	12
	22	0	UNL	15			63	57	53	70	29	11
DAY 15	01	0	UNL	12			60	57	54	81	29	12
	04	0	UNL	12			60	57	54	81	30	8
	07	0	UNL	7			65	59	55	70	00	0
	10	0	UNL	7			72	63	58	62	02	7
	13	0	UNL	10			76	65	58	54	05	8
	16	0	UNL	12			76	64	56	50	24	5
	19	0	UNL	12			67	61	57	70	32	8
	22	0	UNL	12			60	58	56	87	30	8
DAY 16	01	0	UNL	12			60	58	56	87	30	6
	04	0	UNL	12			60	58	56	87	27	3
	07	0	UNL	10			64	59	56	75	00	0
	10	0	UNL	12			73	63	57	57	33	5
	13	0	UNL	20			73	63	57	57	20	11
	16	0	UNL	25			72	63	57	59	22	12
	19	0	UNL	25			67	61	56	68	20	7
	22	0	UNL	15			63	59	57	81	24	6
DAY 17	01	1	UNL	15			62	59	57	84	22	5
	04	5	UNL	15			60	58	57	90	22	7
	07	8	17	10			62	59	57	84	21	6
	10	2	UNL	12			69	62	57	66	20	8
	13	0	UNL	15			74	64	58	58	20	11
	16	0	UNL	15			71	63	57	61	24	14
	19	0	UNL	15			64	60	57	78	25	10
	22	1	UNL	15			62	58	55	78	25	10
DAY 18	01	4	UNL	15			61	58	55	81	24	10
	04	9	15	15			61	58	55	81	24	8
	07	10	14	10			62	58	55	78	24	7
	10	10	14	12			62	58	56	81	29	10
	13	0	UNL	20			67	61	56	68	28	15
	16	1	UNL	25			66	59	54	65	27	15
	19	8	19	25			61	57	54	78	25	10
	22	9	15	15			60	57	54	81	24	8
DAY 19	01	8	15	15			58	56	54	87	23	6
	04	10	12	15			57	55	54	90	26	7
	07	10	16	12			58	54	51	78	24	8
	10	10	17	12			59	55	51	75	25	10
	13	6	20	20			64	57	51	63	27	11
	16	8	23	30			63	57	52	68	23	10
	19	10	15	20			60	56	53	78	25	11
	22	10	23	15			59	55	52	78	27	10
DAY 20	01	10	23	15			59	55	52	78	22	7
	04	10	18	15			58	55	53	84	22	5
	07	10	25	12			58	56	55	90	20	6
	10	10	28	30			62	57	53	73	21	9
	13	10	28	30			67	59	54	63	22	14
	16	9	23	30			65	59	54	68	21	9
	19	7	38	15			62	58	55	78	24	11
	22	10	32	15			61	58	55	81	23	11
DAY 21	01	10	17	15			60	57	55	84	19	5
	04	10	18	15			60	57	54	81	22	5
	07	10	28	10			60	57	54	81	20	4
	10	10	29	12			65	59	54	68	19	8
	13	10	40	20			67	59	53	61	23	12
	16	0	UNL	20			67	59	53	61	28	14
	19	0	UNL	20			62	56	52	70	27	8
	22	0	UNL	15			59	55	52	78	27	8
DAY 22	01	0	UNL	15			58	54	51	78	25	5
	04	0	UNL	15			57	54	51	80	26	7
	07	10	16	9			60	56	53	78	30	8
	10	9	19	10			64	57	52	65	28	8
	13	6	UNL	15			66	58	52	61	29	15
	16	3	UNL	15			64	58	53	68	27	17
	19	9	17	12			60	56	53	78	28	10
	22	0	UNL	15			57	54	52	83	27	8
DAY 23	01	8	16	15			58	55	52	81	26	6
	04	10	16	15			58	55	52	81	29	5
	07	10	17	15			59	55	51	75	29	7
	10	10	21	15			61	56	52	72	27	8
	13	5	UNL	20			66	58	52	61	28	15
	16	3	UNL	15			65	58	53	65	28	17
	19	10	15	12			60	56	52	75	28	12
	22	10	15	15			59	55	52	78	27	11
DAY 24	01	10	16	15			59	55	52	78	29	8
	04	10	16	15			58	54	51	78	29	9
	07	10	16	15			58	55	52	81	24	12
	10	10	12	9			58	55	53	84	27	10
	13	0	UNL	15			65	58	52	63	29	16
	16	0	UNL	30			64	57	52	65	27	15
	19	0	UNL	30			59	55	52	78	27	17
	22	0	UNL	15			58	55	52	81	27	13
DAY 25	01	8	14	15			57	54	52	83	26	11
	04	9	13	15			57	54	52	83	27	9
	07	7	15	15			58	55	52	81	29	9
	10	1	UNL	15			64	57	52	65	27	7
	13	0	UNL	15			66	58	52	61	29	16
	16	0	UNL	30			64	57	52	65	29	18
	19	0	UNL	30			59	56	53	81	27	16
	22	10	13	15			57	54	52	83	27	14
DAY 26	01	10	12	15			56	53	51	83	26	10
	04	10	15	15			57	54	51	80	26	7
	07	10	15	15			58	54	51	78	20	6
	10	0	UNL	15			65	58	52	63	33	3
	13	0	UNL	20			70	60	53	55	31	14
	16	0	UNL	30			64	57	52	65	30	17
	19	0	UNL	20			61	56	53	75	28	12
	22	0	UNL	15			57	55	53	87	30	10
DAY 27	01	0	UNL	15			56	54	53	90	29	6
	04	0	UNL	15			55	53	52	90	29	5
	07	0	UNL	9			58	55	53	84	32	3
	10	0	UNL	7			69	62	57	66	06	5
	13	0	UNL	12			76	63	55	48	30	15
	16	0	UNL	30			70	60	53	55	30	22
	19	0	UNL	30			62	56	52	70	31	14
	22	0	UNL	15			58	55	53	84	30	10
DAY 28	01	0	UNL	15			56	54	53	90	29	10
	04	8	UNL	15			55	53	52	90	30	8
	07	0	UNL	9			58	55	53	84	31	9
	10	3	UNL	12			62	57	53	73	30	14
	13	1	UNL	15			69	60	53	57	30	16
	16	0	UNL	15			64	58	53	68	30	18
	19	9	UNL	10			57	55	53	87	30	14
	22	7	UNL	10			55	54	53	93	30	11
DAY 29	01	10	UNL	10			54	53	52	93	29	9
	04	10	250	10			54	53	52	93	25	6
	07	10	120	10			56	54	53	90	24	4
	10	9	120	10			62	57	54	75	32	10
	13	0	UNL	25			65	58	53	65	31	15
	16	0	UNL	30			64	58	53	68	29	17
	19	7	200	20			59	56	54	84	30	16
	22	0	UNL	12			57	55	54	90	30	12
DAY 30	01	10	8	15			57	55	54	90	28	8
	04	10	8	15			57	55	54	90	26	6
	07	10	11	15			58	56	54	87	29	7
	10	4	UNL	12			63	58	54	73	29	11
	13	0	UNL	25			67	59	54	63	29	15
	16	0	UNL	25			66	59	53	63	30	20
	19	2	UNL	20			60	56	53	78	27	18
	22	10	12	15			59	56	54	84	27	13
DAY 31	01	10	10	15			59	57	55	87	27	13
	04	10	8	15			58	56	54	87	27	10
	07	10	8	10			56	54	53	90	29	10
	10	1	UNL	8			62	57	53	73	29	12
	13	0	UNL	20			64	58	53	68	30	18
	16	0	UNL	30			67	59	53	61	31	14
	19	0	UNL	20			61	55	51	70	31	12
	22	0	UNL	12			57	54	52	83	28	13

NOTES

CEILING COLUMN—

UNL indicates an unlimited ceiling.

WEATHER COLUMN—

*	Tornado
T	Thunderstorm
Q	Squall
R	Rain
RW	Rain showers
ZR	Freezing rain
L	Drizzle
ZL	Freezing drizzle
S	Snow
SP	Snow pellets
IC	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
IF	Ice fog
GF	Ground fog
BD	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS—

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, North Carolina 28801.

STATION: SAN FRANCISCO CALIF   YEAR & MONTH: 72 07

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

SAN FRANCISCO, CALIFORNIA
FEDERAL OFFICE BLDG.
JULY 1972

Latitude 37° 47' N Longitude 122 25' W Elevation (ground) 52 ft Standard time used PACIFIC WBAN #23272

Date	Temperature °F: Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65°: Heating	Cooling	Weather types on dates of occurrence: 1 Fog, 2 Heavy fog x, 3 Thunderstorm, 4 Ice pellets, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing snow	Snow, ice pellets or ice on ground at 08AM In	Precipitation: Water equivalent In	Snow, ice pellets In	Avg station pressure In. Elev 155 feet m.s.l.	Wind: Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Sunshine: Hours and tenths	Percent of possible	Sky cover Tenths: Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	64	54	59	1		6	0	DATA ARE NOT ENTERED IN THIS COLUMN BECAUSE RECORDS OF WEATHER TYPES MAY BE INCOMPLETE	0	0	0					26	SW	12.4	84			1
2	63	56	60	2		5	0		0	0	0					23	SW	11.6	79			2
3	63	57	60	2		5	0		0	0	0					21	W	10.2	69			3
4	62	54	58	0		7	0		0	0	0					22	W	12.1	82			4
5	63	54	59	0		6	0		0	0	0					20	W	10.2	69			5
6	61	54	58	-1		7	0		0	0	0					22	W	8.4	57			6
7	61	53	57	-2		8	0		0	0	0					23	W	10.6	72			7
8	66	53	60	1		5	0		0	0	0					26	W	13.6	92			8
9	65	54	60	1		5	0		0	0	0					26	W	14.0	95			9
10	65	54	60	1		5	0		0	0	0					20	SW	14.0	96			10
11	70	55	63	4		2	0		0	0	0					23	W	14.0	96			11
12	77	56	67	8		0	2		0	0	0					24	W	14.6	100			12
13	88	60	74	15		0	9		0	0	0					19	W	14.6	100			13
14	92*	59	76*	17		0	11		0	0	0					21	W	14.6	100			14
15	63	57	60	1		5	0		0	0	0					24	W	11.8	81			15
16	66	57	62	3		3	0		0	0	0					22	SW	12.5	86			16
17	63	58	61	2		4	0		0	0	0					16	W	8.9	61			17
18	66	56	61	2		4	0		0	T	0					18	W	8.0	55			18
19	63	55	59	0		6	0		0	.01	0					16	SW	7.7	53			19
20	65	57	61	2		4	0		0	T	0					17	SW	9.1	63			20
21	66	58	62	3		3	0		0	0	0					15	W	9.4	66			21
22	63	57	60	0		5	0		0	0	0					20	W	12.6	88			22
23	62	57	60	0		5	0		0	0	0					23	W	8.0	56			23
24	64	56	60	0		5	0		0	0	0					21	W	9.3	65			24
25	64	55	60	0		5	0		0	0	0					24	W	11.1	78			25
26	63	55	59	-1		6	0		0	0	0					22	SW	11.0	77			26
27	71	55	63	3		2	0		0	0	0					26	W	14.2	100			27
28	62	53	58	-2		7	0		0	0	0					26	W	10.3	73			28
29	61	53*	57*	-3		8	0		0	0	0					23	W	10.3	73			29
30	64	56	60	0		5	0		0	0	0					23	W	10.2	72			30
31	62	55	59	-1		6	0		0	0	0					23	SW	11.1	79			31

Sum	Sum				Total	Total			
2048	1723				144	22			
Avg.	Avg.	Avg.	Dep.	Avg	Dep.	Dep.			
66.1	55.6	60.9	2.1		-48				
					Season to date				
Number of days					Total	Total			
Maximum Temp.		Minimum Temp.			144	30			
≥ 90° ‡	≤ 32°	≤ 32°	≤ 0°		Dep.	Dep.			
1	0	0	0		-48				

Number of days		Precipitation: Water equivalent	Snow, ice pellets
		Total	Total
		.01	0
Precipitation ≥ .01 inch	1	Dep.	
Snow, ice pellets ≥ 1.0 inch	0	0.00	
Thunderstorms			
Heavy fog X			
Clear	Partly cloudy	Cloudy	

For the month:	Fastest mile: Speed	Direction	Sunshine: Total	% for month	Sky cover: Sum	Sum
	26	W	350.4			
	Date:	28+	Possible		Avg.	Avg.
			448.9	78		

Greatest in 24 hours and dates: Precipitation		Snow, ice pellets		Greatest depth on ground of snow, ice pellets or ice and date	
.01	19	0		0	

HOURLY PRECIPITATION (Water equivalent in inches) – Entry of Trace amounts may be incomplete.

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4																									4
5																									5
6																									6
7																									7
8																									8
9																									9
10																									10
11																									11
12																									12
13																									13
14																									14
15																									15
16																									16
17																									17
18																			T	T	T	T	T	T	18
19				T	.01	T	T																		19
20					T	T																			20
21																									21
22																									22
23																									23
24																									24
25																									25
26																									26
27																									27
28																									28
29																									29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.

Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	Averages: Sky cover Tenths	Station pressure In.	Temperature: Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind: Direction	Speed m.p.h.

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

OAKLAND, CALIFORNIA
INTERNATIONAL AIRPORT
JULY 1972

Latitude 37° 44' N Longitude 122° 12' W Elevation (ground) 6 ft Standard time used PACIFIC WBAN #23230

Date	Temperature °F: Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65°: Heating	Cooling	Weather types on dates of occurrence 1 Fog 2 Heavy fog X 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, Haze 9 Blowing snow	Snow, ice pellets or ice on ground at 04AM In	Precipitation: Water equivalent In	Snow, ice pellets In	Avg station pressure In. Elev. 7 feet m.s.l.	Wind: Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Sunshine: Hours and tenths	Percent of possible	Sky cover Tenths: Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	75	57	66	2	56	0	1		0	0	0	29.83	32	10.7	11.5	20	31			6	4	1
2	72	60	66	2	56	0	1		0	0	0	29.89	30	9.0	10.1	17	31			6	6	2
3	68	60	64	0	55	1	0		0	0	0	30.00	29	9.4	9.6	14	28			5	5	3
4	69	59	64	0	54	1	0		0	0	0	30.03	29	10.3	10.6	14	28			6	6	4
5	68	58	63	-2	53	2	0		0	0	0	30.03	29	11.1	11.4	15	28			4	6	5
6	63	57	60*	-5	54	5	0		0	T	0	30.04	26	9.9	10.2	16	27			8	8	6
7	65	57	61	-4	54	4	0		0	0	0	30.03	27	9.4	9.9	14	28			9	8	7
8	70	55	63	-2	55	2	0		0	0	0	30.03	28	5.9	8.2	16	28			3	4	8
9	68	57	63	-2	54	2	0		0	0	0	30.01	26	9.7	10.4	20	26			0	1	9
10	67	57	62	-3	54	3	0		0	0	0	29.97	28	7.0	8.6	14	27			0	1	10
11	79	57	68	3	57	0	3		0	0	0	29.97	29	6.4	7.8	15	30			0	0	11
12	83	60	72	7	59	0	7		0	0	0	29.96	30	7.9	8.3	16	30			0	0	12
13	94	63	79	14	60	0	14		0	0	0	29.87	30	7.1	7.8	15	31			1	0	13
14	99*	65	82*	17	60	0	17		0	0	0	29.73	30	7.3	7.6	14	31			0	0	14
15	76	61	69	4	58	0	4		0	0	0	29.77	33	12.2	12.7	20	33			0	2	15
16	74	61	68	3	59	0	3		0	0	0	29.86	30	8.4	9.2	14	31			2	4	16
17	70	62	66	1	60	0	1		0	0	0	29.95	30	11.4	12.4	20	31			5	7	17
18	68	61	65	0	58	0	0		0	T	0	29.97	28	12.7	12.9	18	26			6	8	18
19	64	59	62	-3	55	3	0		0	T	0	29.90	27	12.9	13.1	16	24			9	9	19
20	64	60	62	-3	56	3	0		0	T	0	29.88	24	11.2	11.4	15	25			10	10	20
21	68	61	65	0	56	0	0		0	T	0	29.99	26	8.6	9.5	14	28			6	5	21
22	66	60	63	-2	55	2	0		0	0	0	30.01	27	10.7	10.8	16	27			6	5	22
23	66	60	63	-1	54	2	0		0	0	0	29.97	28	10.0	10.1	17	27			7	8	23
24	67	59	63	-1	55	2	0		0	T	0	29.95	27	10.1	10.5	14	28			5	5	24
25	66	58	62	-2	55	3	0		0	0	0	29.96	27	10.8	11.2	17	27			3	5	25
26	68	58	63	-1	54	2	0		0	0	0	30.00	29	8.4	9.6	14	30			3	4	26
27	75	55*	65	1	57	0	0		0	0	0	29.98	30	5.7	7.3	16	31			0	0	27
28	69	57	63	-1	56	2	0		0	0	0	29.95	30	10.0	10.6	15	29			3	4	28
29	67	57	62	-2	56	3	0		0	T	0	29.93	30	10.3	11.9	16	31			5	6	29
30	67	59	63	-1	56	2	0		0	0	0	30.00	28	9.6	9.8	16	31			4	6	30
31	66	58	62	-2	56	3	0		0	0	0	30.09	27	10.0	10.2	16	29			4	4	31
	Sum 2201	Sum 1828				Total 47	Total 51			Total T	Total 0	For the month: 29.95	28	8.9	10.2	20	31	Total	% for month	Sum 126	Sum 141	
	Avg 71.0	Avg 59.0	Avg 65.0	Dep 0.7	Avg 56	Dep -6	Dep			Dep 0.00						Date	17+	Possible		Avg 4.1	Avg 4.5	

Number of days	
Precipitation ≥ .01 inch	0
Snow, ice pellets ≥ 1.0 inch	0
Thunderstorms	0
Heavy fog X	0

Clear 13 Partly cloudy 14 Cloudy 4

Season to date: Heating Total	Cooling Total
47	80
Dep -6	Dep

Number of days: Maximum Temp ≥ 90° ‡	Maximum Temp ≤ 32°	Minimum Temp ≤ 32°	Minimum Temp ≤ 0°
2	0	0	0

Greatest in 24 hours and dates: Precipitation	Date	Snow, ice pellets	Date	Greatest depth on ground of snow, ice pellets or ice and date	Date
T	29+	0		0	

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at: 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at: 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4																									4
5																									5
6										T	T														6
7																									7
8																									8
9																									9
10																									10
11																									11
12																									12
13																									13
14																									14
15																									15
16																									16
17																									17
18																									18
19	T	T																		T	T	T	T		19
20						T	T																		20
21						T																			21
22																									22
23																									23
24										T	T														24
25																									25
26																									26
27																									27
28																									28
29							T																		29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
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William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	Averages: Sky cover Tenths	Station pressure In.	Temperature: Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind: Direction	Speed m.p.h.
01	6	29.94	61	58	56	84	9.3	28	8.2
04	7	29.94	60	57	55	85	8.4	29	6.1
07	7	29.97	61	58	55	83	6.6	29	4.7
10	5	29.98	64	60	56	75	8.2	27	7.4
13	3	29.97	70	62	56	64	12.2	29	11.4
16	1	29.94	69	62	56	65	13.6	29	12.9
19	3	29.93	64	60	56	76	12.5	29	11.6
22	4	29.96	61	58	56	83	10.5	28	9.5

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER Tenths	CEILING Hunds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED Knots	SKY COVER Tenths	CEILING Hunds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED Knots	SKY COVER Tenths	CEILING Hunds of ft	VISIBILITY WHOLE MILES	VISIBILITY 16ths MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED Knots
					DAY 01											DAY 02											DAY 03						
01	3	UNL	9			60	57	55	84	33	7	2	UNL	12			61	58	56	84	30	6	10	12	12			61	58	56	84	28	8
04	4	UNL	9			58	56	55	90	33	10	10	18	12			61	58	56	84	01	7	10	13	12			61	58	55	81	28	7
07	10	UNL	7			60	57	55	84	35	8	10	17	13			61	58	56	84	27	7	10	14	14			61	58	55	81	30	5
10	7	UNL	8			67	61	57	70	28	8	3	UNL	12			65	59	55	70	28	9	8	21	10			64	59	55	73	32	7
13	6	UNL	12			72	63	57	59	31	10	6	UNL	14			71	62	56	59	31	13	2	UNL	10			66	60	55	68	30	10
16	2	UNL	12			71	63	58	64	30	11	3	UNL	14			69	61	56	63	30	12	0	UNL	13			67	60	55	66	29	10
19	2	UNL	10			65	60	57	75	34	14	3	UNL	14			64	59	56	75	28	11	1	UNL	13			62	58	55	78	29	10
22	0	UNL	12			61	59	57	87	35	6	4	UNL	12			61	58	56	84	27	9	1	UNL	15			61	58	55	81	28	10
					DAY 04											DAY 05											DAY 06						
01	7	17	15			60	57	55	84	30	9	9	15	15			59	56	54	84	29	7	10	9	15			58	56	55	90	25	8
04	10	15	15			60	57	54	81	27	8	10	16	15			58	55	53	84	28	10	10	9	15			57	55	54	90	25	9
07	10	16	15			59	56	53	81	32	7	10	15	15			58	55	52	81	30	7	10	9	9			57	55	54	90	28	5
10	2	UNL	15			62	58	54	73	27	9	10	21	15			61	56	52	72	29	7	10	8	9		L	58	56	54	87	25	10
13	5	UNL	25			69	60	54	59	30	12	0	UNL	20			66	58	52	61	31	11	10	13	10			60	57	55	84	28	7
16	5	UNL	25			67	59	54	63	28	11	0	UNL	30			65	58	53	65	30	13	2	UNL	10			62	58	54	73	28	12
19	8	250	20			61	57	54	78	29	11	0	UNL	20			60	57	54	81	28	13	3	UNL	10			60	57	54	81	27	10
22	5	UNL	15			59	56	54	84	30	10	10	15	15			59	56	54	84	28	11	7	14	12			58	55	53	84	26	10
					DAY 07											DAY 08											DAY 09						
01	10	14	12			58	55	53	84	27	10	4	UNL	15			58	56	54	87	00	0	6	UNL	15			59	56	54	84	25	7
04	10	12	12			57	55	53	87	24	8	4	UNL	15			56	54	53	90	05	5	4	UNL	15			57	54	52	83	33	6
07	10	11	9			57	55	53	87	23	7	8	UNL	30			60	57	54	81	04	5	0	UNL	13			61	57	54	78	00	0
10	10	10	10			60	56	53	78	27	8	2	UNL	30			64	58	53	68	23	6	0	UNL	15			65	59	55	70	27	6
13	10	UNL	20			63	58	54	73	29	9	0	UNL	40			70	62	57	64	27	11	0	UNL	25			68	62	56	61	27	15
16	6	UNL	20			64	59	55	73	27	8	0	UNL	40			68	63	59	73	29	12	0	UNL	30			67	59	54	63	26	17
19	7	UNL	20			61	57	54	78	29	9	7	UNL	30			64	60	57	78	28	10	0	UNL	25			64	58	53	68	26	12
22	6	UNL	15			58	56	54	87	27	10	6	UNL	15			60	57	55	84	28	10	0	UNL	15			61	56	52	72	24	9
					DAY 10											DAY 11											DAY 12						
01	0	UNL	15			60	56	52	75	27	6	0	UNL	15			60	57	55	84	25	9	0	UNL	12			63	59	57	81	31	7
04	0	UNL	15			58	54	51	78	35	4	0	UNL	15			58	55	53	84	03	3	0	UNL	12			61	58	56	84	34	5
07	0	UNL	15			60	56	53	78	12	4	0	UNL	10			62	58	56	81	00	0	0	UNL	9			65	61	58	78	31	3
10	0	UNL	15			65	59	54	68	26	7	0	UNL	9			67	62	58	73	23	6	0	UNL	7			72	64	59	64	26	5
13	0	UNL	15			66	59	54	65	27	10	0	UNL	12			75	65	58	56	30	10	0	UNL	9			83	68	60	46	30	10
16	0	UNL	15			66	60	55	68	28	11	0	UNL	15			74	64	58	58	30	11	0	UNL	13			78	67	60	54	30	13
19	2	UNL	15			62	58	55	78	28	10	0	UNL	15			69	62	58	68	30	9	0	UNL	20			73	65	60	64	31	11
22	4	UNL	12			60	57	55	84	27	8	0	UNL	15			63	60	58	84	31	6	0	UNL	15			66	61	58	76	27	6
					DAY 13											DAY 14											DAY 15						
01	0	UNL	15			65	61	58	78	35	5	0	UNL	15			68	64	61	78	29	6	0	UNL	12			64	60	57	78	32	10
04	0	UNL	15			64	60	58	81	01	4	0	UNL	15			66	62	60	81	33	5	0	UNL	12			62	58	56	81	32	10
07	3	UNL	15			70	64	60	71	27	3	0	UNL	15			71	64	60	68	30	3	0	UNL	10			63	59	56	78	36	7
10	0	UNL	7			76	68	63	64	27	7	0	UNL	10			80	70	64	58	27	6	0	UNL	8			71	64	60	68	30	8
13	0	UNL	10			93	71	58	32	30	10	0	UNL	10			97	74	62	31	31	10	0	UNL	12			73	64	58	59	34	12
16	0	UNL	20			91	70	58	33	30	10	0	UNL	20			91	69	56	31	32	10	0	UNL	10			72	64	59	64	32	15
19	0	UNL	30			79	68	62	56	30	10	0	UNL	20			81	67	59	47	29	6	2	UNL	9			65	61	59	81	34	16
22	0	UNL	15			71	65	61	71	30	9	0	UNL	15			70	63	59	68	30	7	10	6	12			62	60	59	90	34	10
					DAY 16											DAY 17											DAY 18						
01	10	6	10			62	60	59	90	32	8	10	14	12			64	62	60	87	27	7	10	13	12			63	60	58	84	26	10
04	10	9	10			62	60	58	87	33	8	10	9	12			63	61	59	87	30	11	10	15	12			63	60	58	84	27	12
07	10	12	15			62	60	59	87	34	6	10	8	10			62	60	59	90	36	5	10	14	12			62	60	58	87	28	11
10	0	UNL	15			68	63	59	73	23	3	9	15	10			68	63	60	76	34	8	10	12	15			63	60	58	84	29	9
13	0	UNL	20			74	65	59	60	29	9	1	UNL	12			70	64	61	73	30	14	0	UNL	20			67	62	58	73	29	9
16	0	UNL	20			73	66	61	66	30	10	5	UNL	12			67	63	60	78	31	17	0	UNL	20			68	62	58	71	28	12
19	0	UNL	20			69	63	59	71	31	10	2	UNL	11			65	61	59	81	29	12	9	18	15			63	59	57	81	26	15
22	0	UNL	15			65	62	60	84	28	10	6	14	15			63	61	59	87	28	12	10	11	12		L	61	59	57	87	28	12
					DAY 19											DAY 20											DAY 21						
01	10	11	10		L	60	58	57	90	27	9	10	22	15			61	57	54	78	25	10	10	24	15			63	59	57	81	23	10
04	10	14	12			60	58	57	90	26	11	10	25	15			60	57	55	84	22	6	10	20	15			63	59	57	81	24	8
07	10	20	15			59	56	54	84	27	11	10	28	15			60	58	56	87	24	9	10	19	12			61	59	58	90	22	5
10	10	18	15			61	57	54	78	27	11	10	17	20			62	58	56	81	23	11	10	35	15			63	59	57	81	28	7
13	8	23	15			63	57	53	70	27	12	10	29	30			64	59	56	75	23	10	7	28	20			66	60	56	70	25	8
16	7	28	20			64	58	54	70	27	13	10	34	30			64	59	56	75	23	13	0	UNL	15			68	61	56	66	29	9
19	10	25	15			61	58	55	81	28	12	10	35	20			63	59	57	81	24	10	0	UNL	15			64	59	55	73	28	12
22	10	16	15			61	58	55	81	25	12	10	25	15			63	59	57	81	24	10	0	UNL	15			62	57	54	75	29	7
					DAY 22											DAY 23											DAY 24						
01	0	UNL	12			61	57	54	78	28	6	10	16	10			60	57	55	84	28	8	10	16	10			60	57	56	81	28	12
04	2	UNL	12			60	57	54	81	28	8	10	16	12			60	57	54	81	28	5	10	15	15			60	57	56	81	27	7
07	10	18	12			61	58	55	81	28	8	10	19	15			60	56	53	78	29	6	10	15	13			60	57	56	81	27	8
10	9	22	12			61	57	54	78	27	6	10	19	15			60	57	54	81	27	8	10	9	8		L	59	57	55	87	23	9
13	6	UNL	12			66	60	55	68	27	11	4	UNL	20			64	58	54	70	27	10	0	UNL	15			64	59	55	73	28	6
16	3	UNL	10			66	60	56	70	27	14	0	UNL	12			65	59	55	70	29	9	0	UNL	20			66	60	55	68	29	12
19	3	UNL	9			61	58	56	84	27	12	10	19	9			61	58	55	81	27	12	0	UNL	25			62	58	55	78	28	12
22	7	15	12			60	57	55	84	28	10	9	19	10			60	57	54	81	28	12	0	UNL	15			60	57	55	84	25	11
					DAY 25											DAY 26											DAY 27						
01	6	15	12			58	57	55	87	25	10	10	14	15			58	56	54	87	28	9	0	UNL	15			58	56	55	90	36	4
04	10	14	12			59	57	55	87	27	5	10	15	15			58	55	53	84	24	9	0	UNL	15			57	55	54	90	08	4
07	10	16	12			59	56	54	84	25	8	10	17	15			59	56	53	81	27	8	0	UNL	10			60	58	56	87	00	0
10	2	UNL	12			62	58	55	78	28	7	7	21	15			61	56	53	75	28	9	0	UNL	10			64	61	59	84	25	6
13	0	UNL	13			65	59	55	70	30	11	0	UNL	15			67	60	55	66	33	10	0	UNL	12			73	64	58	59	29	9
16	0	UNL	15			66	60	55	68	28	12	0	UNL	15			66	60	56	70	31	11	0	UNL	15			74	64	58	58	29	11
19	0	UNL	15			62	58	55	78	27	13	0	UNL	15			63	58	55	75	30	10	0	UNL	15			67	61	56	68	30	10
22	8	18	15			60	57	55	84	26	12	0	UNL	15			59	57	55	87	31	9	0	UNL	15			62	58	56	81	29	7
					DAY 28											DAY 29											DAY 30						
01	0	UNL	15			60	58	56	87	32	12	10	3	7			57	56	55	93	31	11	10	7	12			60	58	56	87	28	9
04	4	UNL	12			58	56	55	90	32	9	10	6	10			58	56	55	90	29	7	10	7	15			60	58	56	87	28	8
07	4	UNL	8			60	58	56	87	34	7	10	9	10			58	56	55	90	19	5	10	9	12			60	58	56	87	27	5
10	4	UNL	12			62	58	55	78	28	9	7	120	15			63	59	56	78	31	11	10	17	10			62	58	56	81	28	6
13	2	UNL	15			68	61	56	66	30	9	1	UNL	20			66	60	56	70	31	12	0	UNL	15			66	60	56	70	29	11
16	1	UNL	15			66	61	57	73	30	12	0	UNL	20			66	60	56	70	28	13	0	UNL	20			67	61	57	70	29	10
19	3	UNL	15			61	58	56	84	27	8	6	UNL	20			63	59	56	78	29	10	0	UNL	15			62	58	56	81	29	10
22	8	9	10			58	56	55	90	29	8	4	UNL	10			60	58	56	87	32	14	10	11	15			61	58	56	84	28	9
					DAY 31																												
01	10	11	10			61	58	56	84	28	10																						
04	10	9	10			60	58	57	90	26	8																						
07	10	8	9			60	58	56	87	30	7																						
10	10	12	9			61	58	56	84	27	7																						
13	0	UNL	15			64	59	56	75	27	11																						
16	0	UNL	20			66	60	56	70	28	12																						
19	0	UNL	15			62	58	56	81	27	8																						
22	0	UNL	12			60	57	55	84	26	8																						

ADDITIONAL DATA

Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, North Carolina 28801.

STATION: OAKLAND CALIFORNIA YEAR & MONTH: 72 07

NOTES

CEILING COLUMN—

UNL indicates an unlimited ceiling.

WEATHER COLUMN—

*	Tornado
T	Thunderstorm
Q	Squall
R	Rain
RW	Rain showers
ZR	Freezing rain
L	Drizzle
ZL	Freezing drizzle
S	Snow
SP	Snow pellets
IC	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
IF	Ice fog
GF	Ground fog
BD	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS—

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

SAN JOSE WEATHER STATION
DEPARTMENT OF CIVIL DEFENSE - CITY OF SAN JOSE
MONTHLY METEOROLOGICAL SUMMARY
120th MERIDIAN TIME

SAN JOSE, CALIFORNIA (CO-OPERATIVE STATION OF THE NATIONAL WEATHER SERVICE) July 1972

ATITUDE 37° 20' N. LONGITUDE 12° 53' W. ELEVATION (GROUND) 67 ft. PACIFIC STANDARD TIME USED

	TEMPERATURES (F)						MOISTURE			WIND			
	EXTREMES											FASTEST MILE	
DATE	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS - BASE 65°	ATMOSPHERIC PRESSURE AT 4:00 PM PST	DEWPOINT AT 4:00 PM PST	RELATIVE HUMIDITY AT 4:00 PM PST	* PRECIPITATION (INCHES AND HUNDREDTHS) MIDNIGHT TO MIDNIGHT	* DAILY PREVAILING WIND DIRECTION	* AVERAGE SPEED	* DIRECTION	* SPEED (MPH)
1	97	58	78	+11	0	29.77	60	48	.00	S	6.3	NW	11
2	82	57	70	+ 3	0	29.84	59	50	.00	NW	6.7	NW	12
3	79	60	70	+ 3	0	29.95	59	55	.00	NW	6.0	N	13
4	78	60	69	+ 1	0	29.98	55	53	.00	N	5.6	NW	13
5	76	58	67	- 1	0	29.97	58	59	.00	N	5.9	N	12
6	74	57	66	- 2	0	29.99	54	60	.00	N	6.5	NW	13
7	77	51	64	- 4	1	29.99	59	55	.00	NW	5.8	NW	11
8	82	54	68	0	0	29.98	58	52	.00	N	6.8	N	16
9	79	57	68	0	0	29.98	48	35	.00	NW	6.7	NW	16
10	81	56	69	+ 1	0	29.92	56	54	.00	NW	6.1	NW	13
11	91	55	73	+ 5	0	29.90	60	38	.00	NW	4.7	NW	11
12	98	61	80	+12	0	29.90	62	32	.00	NW	4.5	NW	11
13	103	65	84	+16	0	29.77	61	27	.00	NW	5.0	NW	16
14	108	68	88	+20	0	29.66	61	24	.00	NW	4.5	NW	13
15	105	63	84	+16	0	29.75	62	46	.00	NW	5.9	NW	11
16	85	61	73	+ 5	0	29.80	45	43	.00	S	8.2	SW	16
17	83	61	72	+ 4	0	29.89	64	63	.00	NW	6.6	NW	14
18	80	60	70	+ 2	0	29.88	59	55	.00	NW	7.2	N	16
19	76	61	69	+ 1	0	29.83	52	52	.00	N	7.4	NW	16
20	75	60	68	0	0	29.85	56	57	.00	S	7.7	SW	18
21	76	62	69	+ 1	0	29.94	57	54	.00	SW	7.6	NW	17
22	76	55	66	- 3	0	29.95	56	54	.00	N	5.8	NW	13
23	74	58	66	- 3	0	29.90	58	61	.00	NW	6.4	NW	13
24	75	59	67	- 2	0	29.88	56	54	.00	N	7.0	NW	15
25	77	54	66	- 3	0	29.90	57	54	.00	N	6.7	NW	15
26	80	56	68	- 1	0	29.93	57	31	.00	NW	4.3	NW	13
27	90	53	72	+ 3	0	29.90	57	35	.00	NW	4.8	NW	13
28	88	57	73	+ 4	0	29.85	63	55	.00	NW	5.5	NW	13
29	82	58	70	+ 1	0	29.83	59	50	.00	NW	6.2	NW	11
30	79	60	70	+ 1	0	29.94	60	59	.00	NW	6.2	NW	13
31	80	59	70	+ 1	0	30.03	59	50	.00	NW	5.6	NW	11
SUM/MEAN	83	59	71	+ 3	(1)	29.89	58	49	.00	NW	6.1	SW	18
NORMALS	81	55	68	---	(12)	29.93	--	50	T	NW	6.2		

ATMOSPHERIC PRESSURE

HIGHEST . . . . 30.03; DATE 31
LOWEST . . . . 29.66; DATE 14

TEMPERATURE

HIGHEST . . . . 108; DATE 14
LOWEST . . . . 51; DATE 7
GREATEST DAILY RANGE . 42; DATE 15
LOWEST DAILY RANGE . . 14; DATE 21

HEATING DEGREE DAYS (BASE 65°)

TOTAL THIS MONTH 1
DEPARTURE FROM NORMAL . . . . . . -11
SEASONAL TOTAL SINCE JULY 1 . . 1
SEASONAL DEPARTURE FROM NORMAL -11

RAINFALL

GREATEST FALL THIS MONTH IN --.- -
5 MINUTES . . . . . .00; DATE 00
10 MINUTES . . . . . .00; DATE 00
15 MINUTES . . . . . .00; DATE 00
30 MINUTES . . . . . .00; DATE 00
1 HOUR . . . . . . .00; DATE 00
2 HOURS . . . . . . .00; DATE 00
24 HOURS . . . . . . .00; DATE 00

SEASONAL TOTAL ON JULY 31, 1972
SINCE JULY 1, 1972;
YEAR TOTAL 00
LAST YEAR TOTAL .00

DEFICIENCY OR EXCESS THIS MONTH AS
COMPARED WITH NORMAL . . . . . . - T

ACCUMULATED EXCESS OR DEFICIENCY ON
JULY 31, 1972 SINCE JULY 1, 1972 - T

WIND

TOTAL MOVEMENT IN MILES . . 4561
AVERAGE HOURLY VELOCITY . . 6.1
PREVAILING DIRECTION . . . NW
FASTEST MILE THIS MONTH . . 18
DIRECTION NW; DATE 20

PRECIPITATION

DAYS WITH - - - - - -
.01 INCH OR MORE OF RAIN . . . 0
.10 INCH OR MORE OF RAIN . . . 0
.25 INCH OR MORE OF RAIN . . . 0

MISCELLANEOUS PHENOMENA

DAYS WITH - - - - - - -
FOG 0
THUNDERSTORMS 0
HAIL 0

COMPARATIVE DATA FOR THIS MONTH FROM THE RECORDS OF PREVIOUS YEARS

TEMPERATURES

HIGHEST THIS MONTH - 106;DATE 3, 1931
LOWEST THIS MONTH - 43;DATE 4, 1909
NEW HIGH RECORD - 108;DATE 14, 1972

PRECIPITATION

GREATEST FALL THIS MONTH IN - - - -
5 MINUTES 02;DATE 22, 1913
10 MINUTES 02;DATE 22, 1913
15 MINUTES 03;DATE 30, 1966
30 MINUTES 04;DATE 22, 1913
1 HOUR 07;DATE 30, 1966
2 HOURS 10;DATE 30, 1966
24 HOURS 21;DATE 30, 1966

WIND

AVERAGE HOURLY VELOCITY (MILES) 6.2
PREVAILING DIRECTION . . . . . . NW
MAXIMUM VELOCITY RECORDED FOR THIS MONTH SINCE 1908; 30 MPH
DIRECTION SW; DATE 9, 1932
GREATEST AVERAGE VELOCITY FOR WHOLE MONTH - 8.0 MPH - YEAR 1924.

MEAN TEMPERATURE (T) & TOTAL RAINFALL (R)

	T	R		T	R		T	R
1920	64	T	1938	68	T	1956	68	.00
1921	67	.00	1939	67	T	1957	70	T
1922	68	T	1940	63	.00	1958	69	T
1923	65	.00	1941	70	.00	1959	70	.00
1924	65	.00	1942	69	T	1960	69	.02
1925	69	.02	1943	68	.00	1961	71	T
1926	69	.00	1944	66	T	1962	67	.00
1927	67	T	1945	69	.00	1963	67	.00
1928	66	.00	1946	68	T	1964	67	T
1929	67	.00	1947	65	.00	1965	68	T
1930	66	.00	1948	68	.00	1966	67	.21
1931	71	.00	1949	67	.01	1967	71	.00
1932	66	.00	1950	69	T	1968	68	T
1933	68	.00	1951	67	.00	1969	70	.00
1934	66	.00	1952	69	.04	1970	70	.00
1935	67	T	1953	69	.00	1971	69	T
1936	70	.03	1954	69	.00	1972	71	.00
1937	69	.00	1955	66	T			

PRECIFITATION

AVERAGE NUMBER OF DAYS THIS MONTH WITH - - -
.01 INCH OR MORE OF RAIN 0
.25 INCH OR MORE OF RAIN 0

GREATEST NUMBER OF DAYS THIS MONTH WITH - - -
.01 INCH OR MORE OF RAIN 2
YEAR - 1913 & 1936

AVERAGE WEATHER TO BE EXPECTED
AUGUST

DAILY SUNSHINE . . . . . 11 HOURS
DAYS CLEAR 24
PARTLY CLOUDAY 6
CLOUDAY 2
RAINFALL 03
HOURLY WIND VELOCITY . . 6.0
PREVAILIND WIND DIRECTION NW
AVERAGE: MAXIMUM TEMPERATURE 80
MINIMUM TEMPERATURE 55

T INDICATES TRACE * AND OTHER DATES ( ) INDICATES ESTIMATED OR NOT AVAILABLE

VIII. TIDE DATA[2]

The phase data of the tide for each of the two missions, are presented in Table VIII-1. These values are referenced to the Golden Gate in San Francisco as shown in Figure 1.

TABLE VIII-1

SAN FRANCISCO (GOLDEN GATE), CALIFORNIA, 1972

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

APRIL						JULY					
DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.
1	0024	5.2	16	0021	6.3	1	0135	5.0	16	0308	4.3
SA	0655	0.1	SU	0723	-1.4	SA	0824	-0.2	SU	0902	1.1
	1354	4.2		1429	4.6		1536	5.2		1605	5.4
	1833	2.3		1855	2.6		2104	2.4		2232	1.8
2	0047	5.2	17	0108	6.1	2	0234	4.5	17	0420	3.8
SU	0736	0.1	M	0819	-1.3	SU	0903	0.3	M	0944	1.7
	1443	4.0		1537	4.4		1610	5.4		16.45	5.4
	1904	2.6		1952	2.9		2213	1.9		2335	1.4
3	0113	5.1	18	0203	5.8	3	0354	4.0	18	0546	3.5
M	0824	0.1	TU	0925	-1.0	M	0946	0.9	TU	1027	2.2
	1543	3.8		1647	4.4		1650	5.7		1726	5.4
	1937	2.9		2106	3.1		2327	1.2			
4	0151	5.0	19	0306	5.4	4	0522	3.7	19	0042	1.0
TU	0921	0.2	W	1029	-0.6	TU	1034	1.6	W	0717	3.5
	1654	3.7		1750	4.5		1731	6.0		1115	2.7
	2032	3.1		2236	3.0					1809	5.5
5	0237	4.9	20	0420	5.0	5	0035	0.5	20	0136	0.6
W	1017	0.2	TH	1134	-0.3	W	0702	3.6	TH	0833	3.7
	1803	3.8		1849	4.6		1133	2.2		1219	3.0
	2141	3.3					1816	6.2		1858	5.6
6	0334	4.8	21	0004	2.7	6	0137	-0.2	21	0223	0.2
TH	1124	0.2	F	0543	4.7	TH	0831	3.8	F	0936	3.9
	1906	4.0		1233	0.0		1234	2.6		1308	3.2
	2309	3.2		1938	4.9		1908	6.5		1946	5.7
7	0449	4.7	22	0119	2.2	7	0235	-0.8	22	0310	-0.1
F	1220	0.1	SA	0659	4.5	F	0941	4.1	SA	1023	4.1
	1947	4.3		1326	0.3		1333	2.9		1404	3.2
				2019	5.1		2006	6.7		2032	5.8

TABLE VIII-1
(Cont)
SAN FRANCISCO (GOLDEN GATE), CALIFORNIA, 1972

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

APRIL						JULY					
DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.	DAY	TIME H.M.	HT. FT.
8	0025	2.9	23	0215	1.7	8	0329	-1.3	23	0347	-0.4
SA	0613	4.7	SU	0809	4.4	SA	1040	4.4	SU	1102	4.3
	1311	0.0		1409	0.6		1437	3.0		1451	3.2
	2022	4.6		2055	5.3		2057	6.8		2110	6.0
9	0128	2.3	24	0303	1.1	9	0418	-1.6	24	0424	-0.6
SU	0727	4.8	M	0910	4.4	SU	1127	4.7	M	1135	4.5
	1357	0.0		1449	1.0		1538	3.0		1540	3.1
	2054	4.9		2.26	5.4		2151	6.8		2153	6.1
10	0223	1.6	25	0344	0.6	10	0506	-1.6	25	0459	-0.8
M	0831	4.9	TU	1005	4.4	M	1214	4.9	TU	1210	4.7
	1443	0.2		1524	1.4		1629	2.9		1623	3.0
	2125	5.3		2153	5.5		2246	6.7		2234	6.1
11	0312	0.8	26	0421	0.2	11	0552	-1.5	26	0533	-0.8
TU	0933	5.0	W	1052	4.4	TU	1256	5.0	W	1239	4.8
	1524	0.5		1554	1.8		1727	2.8		1706	2.8
	2155	5.6		2222	5.5		2335	6.4		2311	6.0
12	0401	0.0	27	0455	-0.1	12	0635	-1.2	27	0606	-0.7
W	1030	5.1	TH	1142	4.4	W	1336	5.2	TH	1307	5.0
	1601	0.9		1623	2.1		1821	2.7		1752	2.5
	2224	6.0		2246	5.5					2356	5.8
13	0450	-0.7	28	0525	-0.3	13	0024	6.0	28	0638	-0.4
TH	1130	5.0	F	1225	4.3	TH	0712	-0.8	F	1335	5.2
	1641	1.3		1656	2.4		1413	5.3		1847	2.2
	2302	6.2		2309	5.4		1918	2.5			
14	0539	-1.2	29	0600	-0.4	14	0115	5.4	29	0043	5.4
F	1230	4.9	SA	1306	4.3	F	0750	-0.2	SA	0713	0.0
	1723	1.8		1727	2.7		1453	5.3		1409	5.4
	2339	6.3		2338	5.4		2021	2.3		1941	1.9
15	0627	-1.4	30	0635	-0.5	15	0210	4.8	30	0139	5.0
SA	1327	4.8	SU	1354	4.2	SA	0827	0.4	SU	0749	0.5
	1806	2.2		1800	2.9		1530	5.4		1439	5.6
				2359	5.3		2124	2.1		2045	1.5
									31	0245	4.4
									M	0830	1.1
										1516	5.8
										2153	1.1

The tidal phase differences at other numerous locations in the Bay area are given in Table VIII-2. To determine the time of high water or low water at any station listed in this table there is given in the columns headed "Differences, Time" the hours and minutes to be added to or subtracted from the time of high or low water at some reference station. A plus (+) sign indicates that the tide at the subordinate station is later than at the reference station and the difference is added, a minus (-) sign that it is earlier and is subtracted. For height differences, a plus (+) sign indicates that the difference is added to the height at the reference station and a minus (-) sign that it is subtracted.

TABLE VIII-2

TIDAL DIFFERENCES

PLACE	POSITION		DIFFERENCES				RANGES		Mean Tide Level
	Lat.	Long.	Time		Height		Mean	Di-urnal	
			High water	Low water	High water	Low water			
San Francisco Bay	° '	° '	h. m.	h. m.	*feet*	*feet*	*feet*	*feet*	*feet*
	N	W			*Time meridian,*		*120°W*		
Bonita Cove, Golden Gate	37 49	122 32	-0 24	-0 06	+0.1	0.0	4.1	5.8	3.1
SAN FRANCISCO (Golden Gate)	37 48	122 28	Daily predictions				4.0	5.7	3.1
Alcatraz Island	37 50	122 25	+0 10	+0 12	+0.1	0.0	4.1	5.8	3.1
San Francisco, North Point	37 49	122 25	+0 15	+0 22	+0.1	0.0	4.1	5.8	3.1
Rincon Point	37 47	122 23	+0 20	+0 36	+0.4	0.0	4.4	6.1	3.3
Yerba Buena Island	37 49	122 22	+0 23	+0 32	+0.3	0.0	4.3	6.0	3.2
Oakland Pier	37 48	122 20	+0 29	+0 42	+0.3	0.0	4.3	6.0	3.2
Alameda	37 46	122 18	+0 35	+0 42	+0.7	0.0	4.7	6.4	3.5
Oakland Harbor, Grove Street	37 48	122 17	+0 29	+0 36	+0.5	0.0	4.5	6.2	3.3
Oakland Harbor, Park Street Bridge	37 46	122 14	+0 40	+0 44	+0.6	0.0	4.6	6.3	3.4
Bay Farm Island Bridge	37 45	122 14	+0 41	+0 52	+0.8	0.0	4.8	6.5	3.5
Oakland Airport	37 44	122 12	+0 40	+0 40	+0.8	0.0	4.8	6.5	3.5
Potrero Point	37 46	122 23	+0 29	+0 40	+0.6	0.0	4.6	6.3	3.4
Point Avisadero, Hunters Point	37 44	122 21	+0 30	+0 43	+0.9	0.0	4.9	6.6	3.5
Roberts Landing, 1.3 miles west of	37 40	122 12	+0 48	+1 22	+1.5	+0.1	5.4	7.2	3.9
Point San Bruno	37 39	122 23	+0 34	+1 04	+1.2	+0.1	5.1	6.9	3.7
Coyote Point	37 36	122 19	+0 37	+1 04	+1.5	0.0	5.5	7.2	3.9
San Mateo Bridge	37 35	122 15	+0 39	+1 14	+1.9	+0.1	5.8	7.6	4.1
Coyote Hill Slough entrance	37 34	122 08	+0 54	+1 26	+2.1	+0.1	6.0	7.8	4.2
Redwood Creek entrance (inside)	37 31	122 12	+1 02	+1 32	+2.2	+0.1	6.1	7.9	4.2

TABLE VIII-2
(Cont.)
TIDAL DIFFERENCES

PLACE	POSITION		DIFFERENCES				RANGES		Mean Tidal Level
	Lat.	Long.	Time		Height		Mean	Di-urnal	
			High water	Low water	High water	Low water			
	° ′	° ′	*h. m.*	*h. m.*	*feet*	*feet*	*feet*	*feet*	*feet*
San Francisco Bay (Cont)	N	W		*Time meridian, 120°W*					
Smith Slough------------------------	37 30	122 14	+1 11	+1 52	+2.2	0.0	6.2	7.9	4.2
Dumbarton Highway Bridge------------	37 30	122 07	+0 48	+1 27	+2.7	+0.1	6.6	8.4	4.5
Palo Alto Yacht Harbor--------------	37 27	122 06	+0 52	+1 48	+2.9	+0.1	6.8	8.6	4.6
Calaveras Point, west of------------	37 28	122 04	+1 01	+1 43	+2.9	+0.1	6.8	8.5	4.6
Mud Slough Railroad bridge----------	37 28	121 58	+1 04	+2 06	+3.5	+0.1	7.4	9.1	4.9
Alviso (bridge), Alviso Slough------	37 26	121 59	+1 20	+2 18	+3.3	+0.1	7.2	9.0	4.8
Guadalupe Slough--------------------	37 26	122 02	+1 05	+2 12	+3.5	+0.1	7.4	9.1	4.9
Sausalito---------------------------	37 51	122 29	+0 09	+0 13	-0.2	0.0	3.8	5.5	3.0
Angel Island (west side)------------	37 52	122 27	+0 09	+0 15	-0.1	0.0	3.9	5.6	3.0
Angel Island (east side)------------	37 52	122 25	+0 22	+0 33	0.0	0.0	4.0	5.7	3.1
Point Chauncey----------------------	37 53	122 27	+0 24	+0 28	0.0	0.0	4.0	5.7	3.1
Berkeley----------------------------	37 52	122 18	+0 17	+0 32	+0.2	0.0	4.2	5.9	3.2
Point Isabel------------------------	37 54	122 19	+0 19	+0 27	+0.2	0.0	4.2	5.9	3.2
Richmond----------------------------	37 55	122 21	+0 21	+0 29	+0.1	0.0	4.1	5.8	3.1
Point Richmond----------------------	37 56	122 24	+0 36	+0 40	+0.2	0.0	4.2	5.9	3.2
Point Orient------------------------	37 57	122 26	+0 47	+0 54	+0.1	0.0	4.1	5.8	3.1
Point San Quentin-------------------	37 57	122 29	+0 46	+0 58	0.0	0.0	4.0	5.7	3.1
San Pablo Bay									
McNear------------------------------	37 59	122 27	+1 05	+1 07	+0.1	0.0	4.1	5.7	3.1
Pinole Point------------------------	38 01	122 22	+1 19	+1 32	+0.4	0.0	4.4	6.0	3.3
Hercules----------------------------	38 01	122 18	+1 26	+1 53	+0.4	0.0	4.4	6.0	3.3
Petaluma River entrance-------------	38 07	122 30	+1 15	+2 15	+0.5	0.0	4.5	6.1	3.3
Lakeville, Petaluma River-----------	38 12	122 33	+1 47	+2 28	+0.8	-0.1	4.9	6.4	3.4
Upper drawbridge, Petaluma River----	38 14	122 37	+1 54	+2 43	+1.0	-0.1	5.1	6.6	3.5
Sonoma Creek entrance---------------	38 09	122 24	+1 30	+2 21	+0.4	-0.2	4.6	6.0	3.2

TABLE VIII-2
(Cont)
TIDAL DIFFERENCES

PLACE	POSITION		DIFFERENCES				RANGES		Mean Tidal Level
	Lat.	Long.	Time		Height				
			High water	Low water	High water	Low water	Mean	Di-urnal	
	° ′	° ′	*h. m.*	*h. m.*	*feet*	*feet*	*feet*	*feet*	*feet*
Carquinez Strait	N	W	*Time meridian, 120°W*						
Selby	38 03	122 15	+1 25	+1 58	+0.7	0.0	4.7	6.3	3.4
Mare Island Strait entrance	38 04	122 15	+1 41	+2 03	+0.2	-0.1	4.3	5.8	3.1
Vallejo, Mare Island Strait	38 06	122 16	+1 41	+2 04	+0.4	-0.1	4.5	6.0	3.2
Napa, Napa River	38 18	122 17	+2 12	+2 46	+1.5	0.0	5.5	7.1	3.8
Crockett	38 03	122 13	+1 53	+2 15	+0.2	-0.1	4.3	5.8	3.1
Benicia, Army Point	38 03	122 08	+1 57	+2 23	+0.3	0.0	4.3	5.9	3.2
Suisun Point	38 02	122 07	+2 08	+2 34	+0.2	-0.1	4.3	5.8	3.2
Suisun Bay									
Port Chicago	38 04	122 02	+2 30	+3 14	-0.2	-0.1	3.9	5.4	2.9
Pittsburg, New York Slough	38 02	121 53	+3 23	+4 13	-1.1	-0.4	3.3	4.4	2.3
Point Buckler	38 06	122 01	+2 36	+3 18	-0.2	-0.3	4.1	5.5	2.8
Suisun Slough entrance	38 07	122 04	+2 45	+3 27	-0.3	-0.3	4.0	5.3	2.8
Suisun, Suisun Slough	38 14	122 02	+3 28	+4 15	+0.9	-0.1	5.0	6.4	3.5
Meins Landing, Montezuma Slough	38 08	121 54	+3 29	+4 11	0.0	-0.3	4.3	5.6	2.9
San Joaquin River									
Antioch	38 01	121 49	+3 56	+4 42	*0.74	*0.55	3.1	4.2	2.2
Threemile Slough entrance	38 05	121 41	+4 50	+5 48	*0.61	*0.45	2.6	3.6	1.8
Sacramento River									
Collinsville	48 04	121 51	+3 41	+4 32	*0.75	*0.55	3.2	4.3	2.2
Threemile Slough entrance†	38 06	121 42	+4 01	+4 56	*0.81	*0.55	3.5	4.6	2.3

*Ratio
†Data apply only during low level stress.

IX. RESULTS OF THE REMOTE SENSING DATA INTERPRETATIONS

The San Francisco Bay Area was divided into four sections and labeled A, B, C, and D. These sections were covered by the reconnaissance aircraft during the daylight hours on April 26, 27, 1972 and July 25, 26, 27, 1972. Two late night missions were flown on July 26, 27, 1972 over sixteen select targets. These targets are the eight major municipal waste sources and the eight major industrial waste sources in the Bay area. They are identified below and their respective locations are shown in Figure 4.

Major Municipal Waste Sources

1. East Bay MUD.
2. City of San Jose.
3. City of San Francisco North Point Plant.
4. City of San Francisco Southeast Plant.
5. Central Contra Costa SD.
6. City of San Mateo.
7. San Pablo SD.
8. City of South San Francisco.

Major Industrial Waste Sources

9. Standard Oil Company
10. Union Oil Company.
11. Fibreboard Corporation-Kraft Mill.
12. C & H Sugar Company.
13. Shell Oil Company.

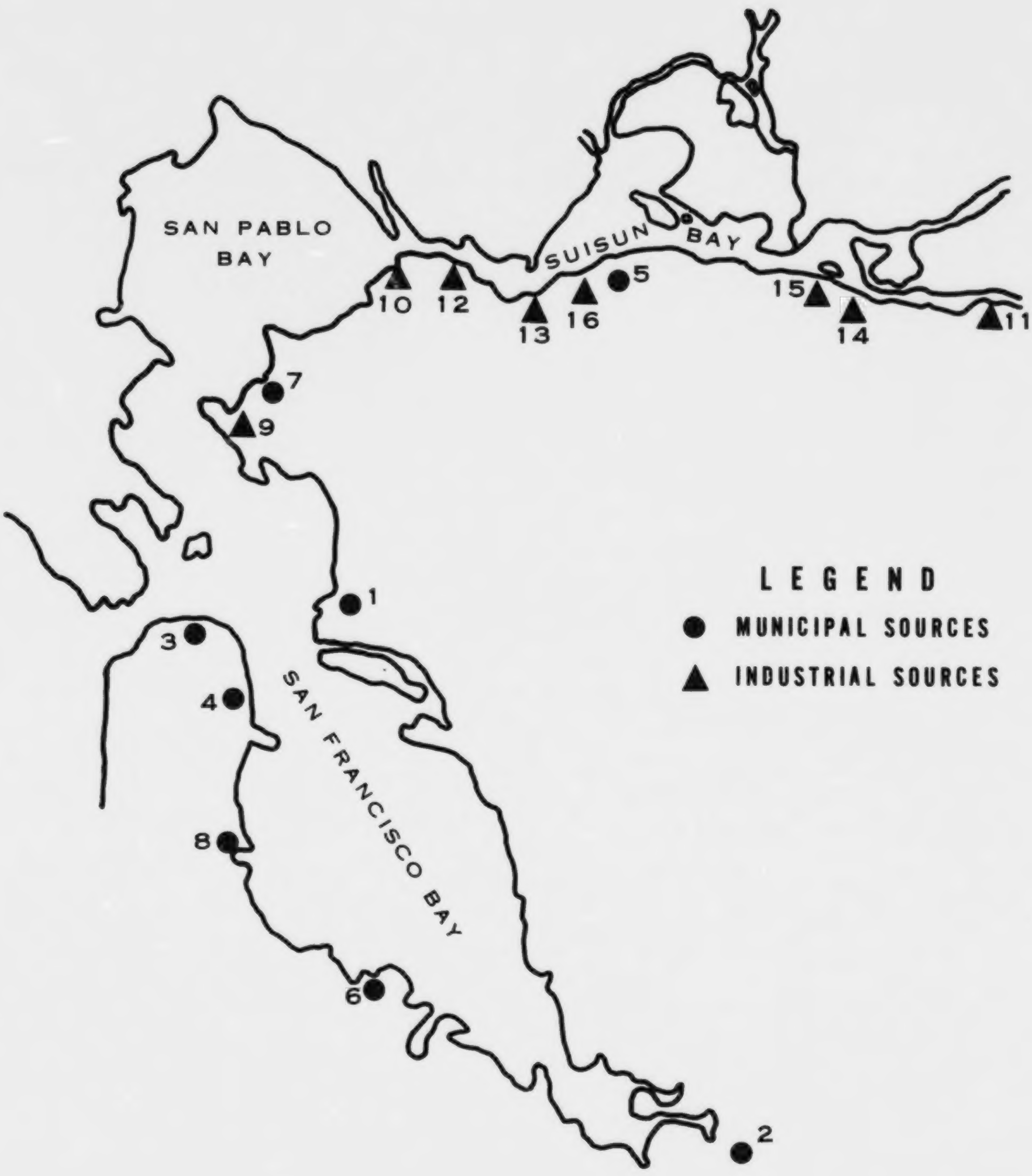

SAN PABLO BAY
SUISUN BAY
SAN FRANCISCO BAY
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
LEGEND
● MUNICIPAL SOURCES
▲ INDUSTRIAL SOURCES

Figure 4. Locations of the Sixteen Major Waste Sources in the Bay Area

14. Dow Chemical Company.
15. U.S. Steel Corporation.
16. Phillips Petroleum Company.

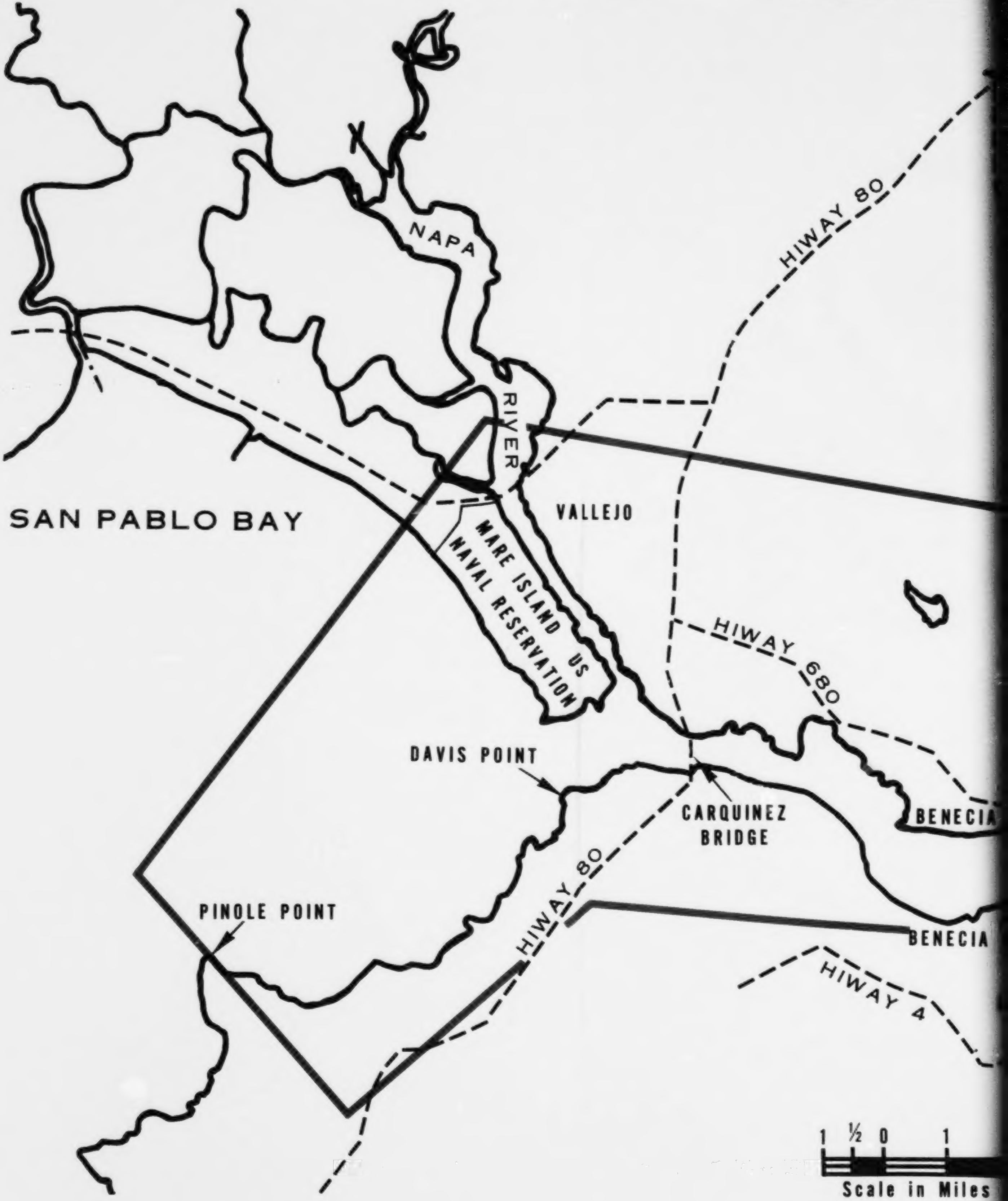
Each waste discharge/significant indication is discussed in outline form in the next four sub-sections of this report. The location of each indication is depicted on the appropriate USGS 7.5 minute map by red numbers. These numbers correspond to the paragraph numbers found in the text or body of this report. The indications recorded during the April, July (daytime) and July nighttime missions are identified as such. If one of the above dates is not included for a particular location (such as July night), then no indication was recorded during flight.

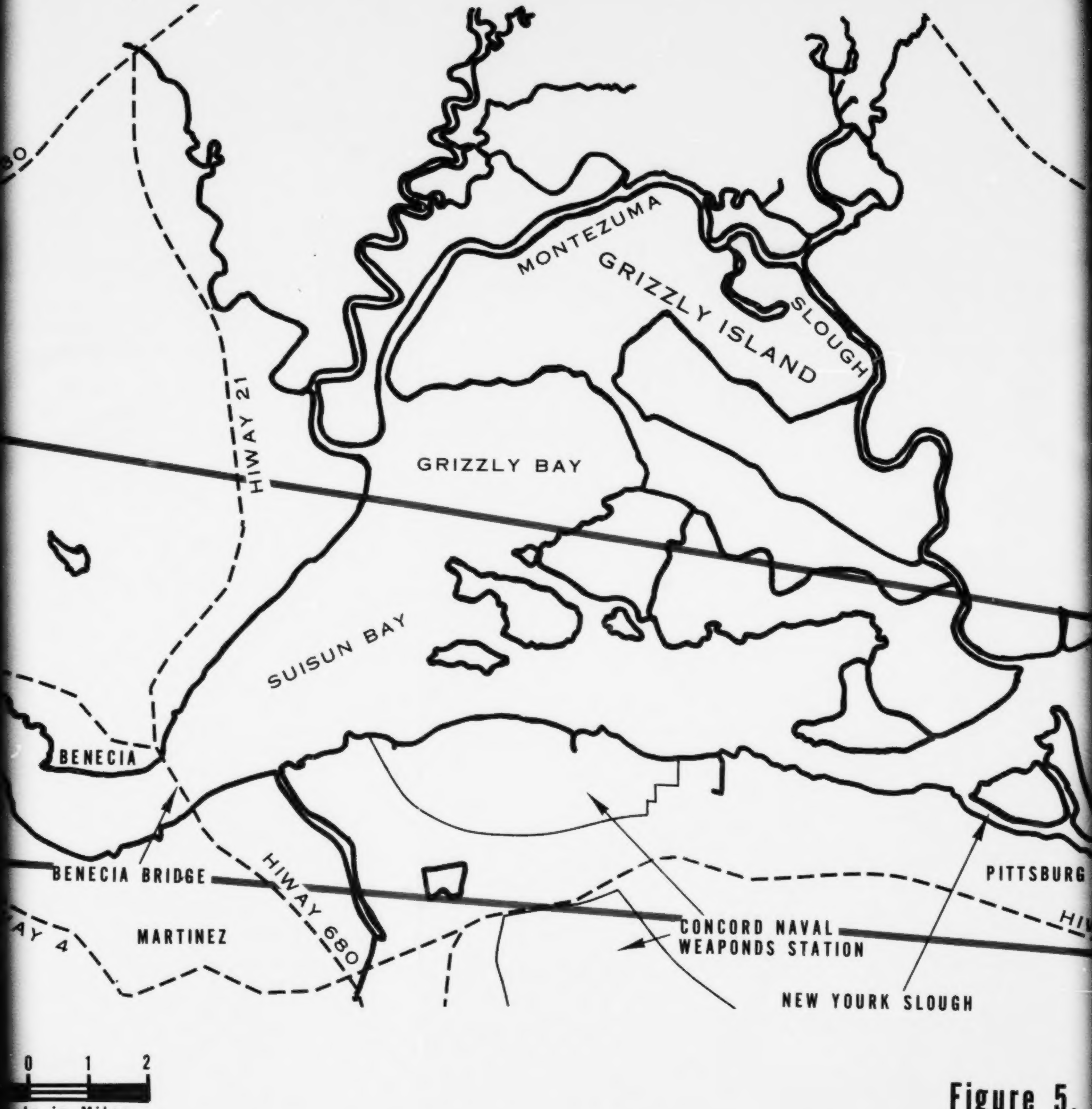
San Francisco Bay Area - Section A

This section covers the area from Pinole Point, in San Pablo Bay, eastward through Suisun Bay to a point along the San Joaquin River approximately 3.2 kilometers (2 miles east) of the City of Antioch. This area is shown in Figure 5. The location of this section is shown in Figure 1.

NOTE: Indication numbers A-1 through A-10 appear on Figure 6, the Mare Island map.

A-1 April - The thermal imagery recorded a large thermal plume around the tip of Pinole Point that extended eastward for approximately 2.14 kilometers (7,000 feet). It is shown in Figure 7. Source of the thermal outflow was not detected in either the thermal or optical reconnaissance data.


NAPA
RIVER
HIWAY 80
SAN PABLO BAY
VALLEJO
MARE ISLAND US
NAVAL RESERVATION
HIWAY 680
DAVIS POINT
CARQUINEZ
BRIDGE
BENECIA
HIWAY 80
PINOLE POINT
BENECIA
HIWAY 4
1 ½ 0 1
Scale in Miles



30
MONTEZUMA
SLOUGH
GRIZZLY ISLAND
HIWAY 21
GRIZZLY BAY
SUISUN BAY
BENECIA
BENECIA BRIDGE
HIWAY 680
PITTSBURG
HIW
AY 4
MARTINEZ
CONCORD NAVAL
WEAPONDS STATION
NEW YOURK SLOUGH
0
1
2
ale in Miles

Figure 5.

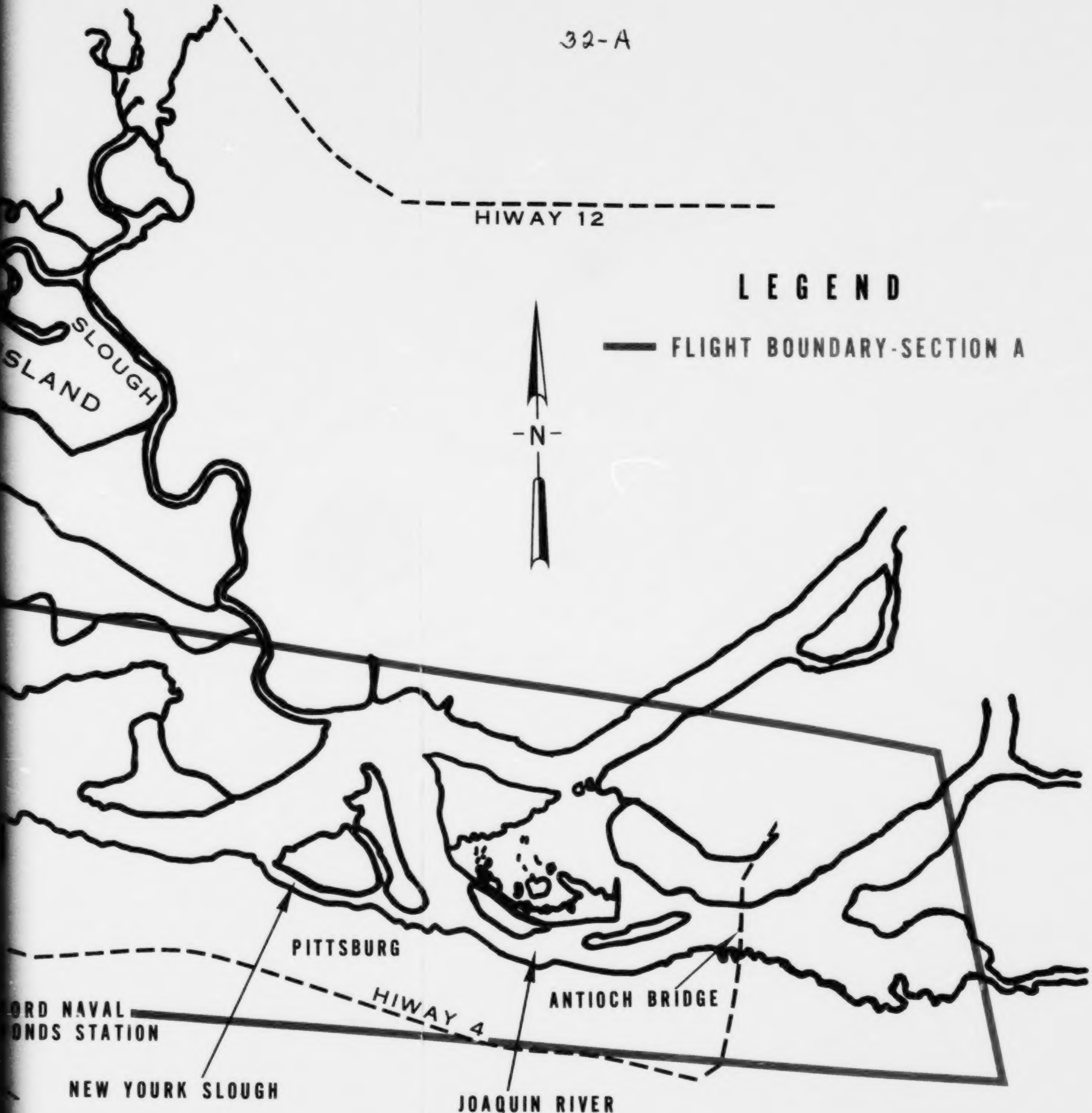
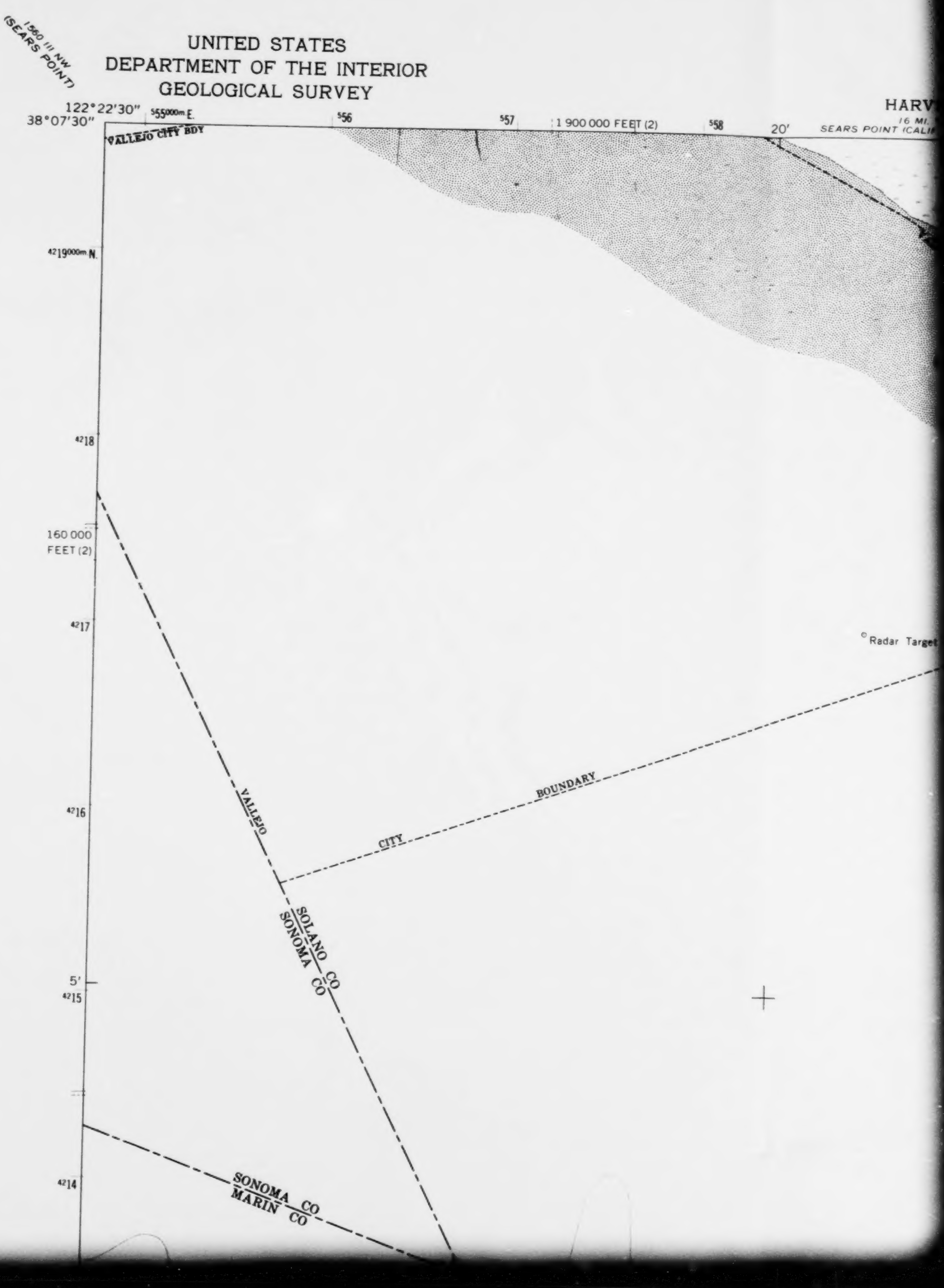

HIWAY 12
LEGEND
FLIGHT BOUNDARY-SECTION A
N
SLOUGH
SLAND
PITTSBURG
ANTIOCH BRIDGE
HIWAY 4
ORD NAVAL
ONDS STATION
NEW YOURK SLOUGH
JOAQUIN RIVER

Figure 5. Section A of the Bay Area

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

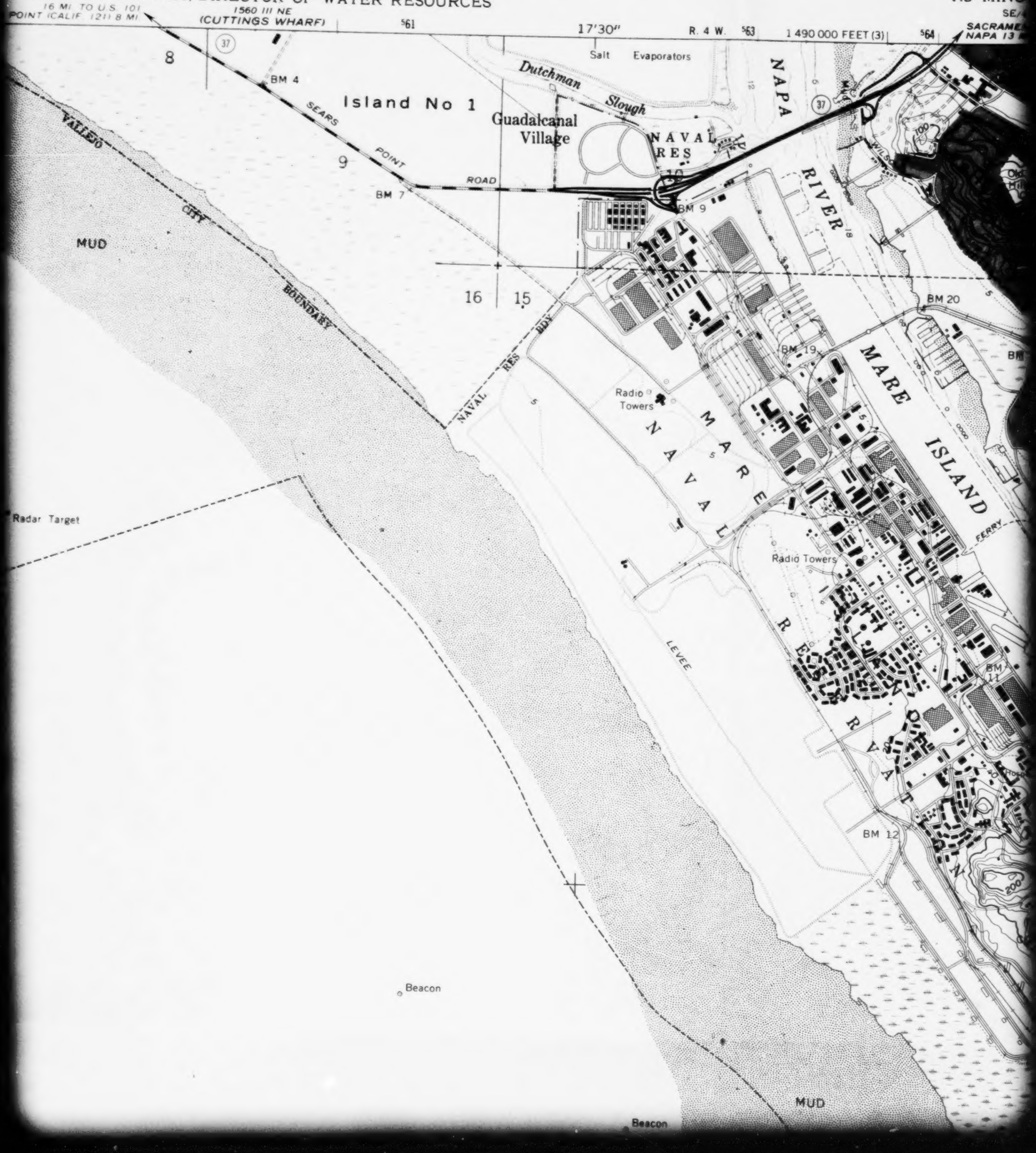

1560 III NW
(SEARS POINT)
122°22'30"
38°07'30"
555000m E.
556
557
1 900 000 FEET (2)
558
20'
HARV
16 MI.
SEARS POINT (CALI
VALLEJO CITY BDY
4219000m N.
4218
160 000
FEET (2)
4217
Radar Target
VALLEJO
CITY
BOUNDARY
4216
SOLANO CO
SONOMA CO
5'
4215
4214
SONOMA CO
MARIN CO

32-B

STATE OF CALIFORNIA
EDMUND G. BROWN, GOVERNOR
HARVEY O. BANKS, DIRECTOR OF WATER RESOURCES

MARE

7.5 MINU

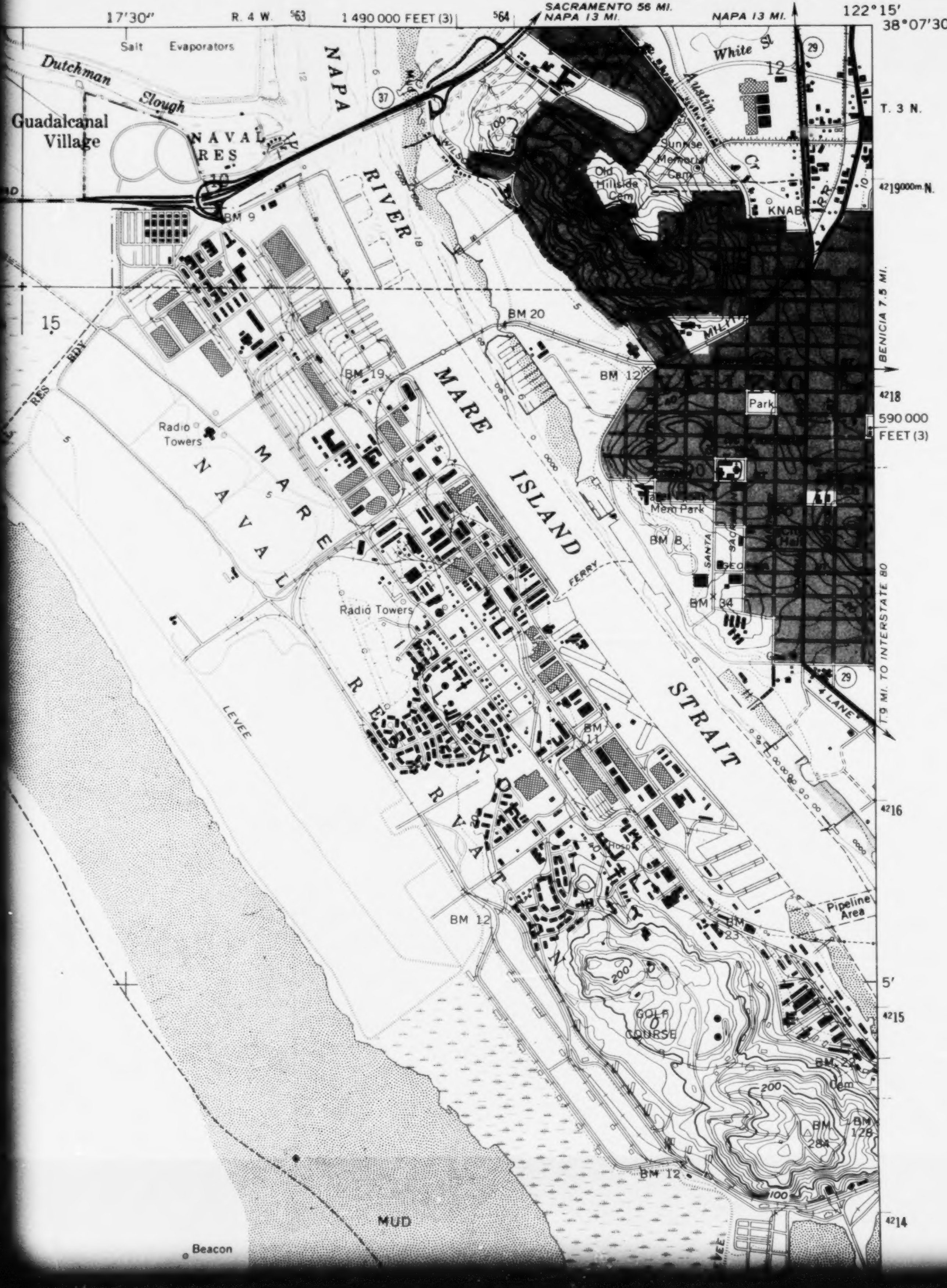


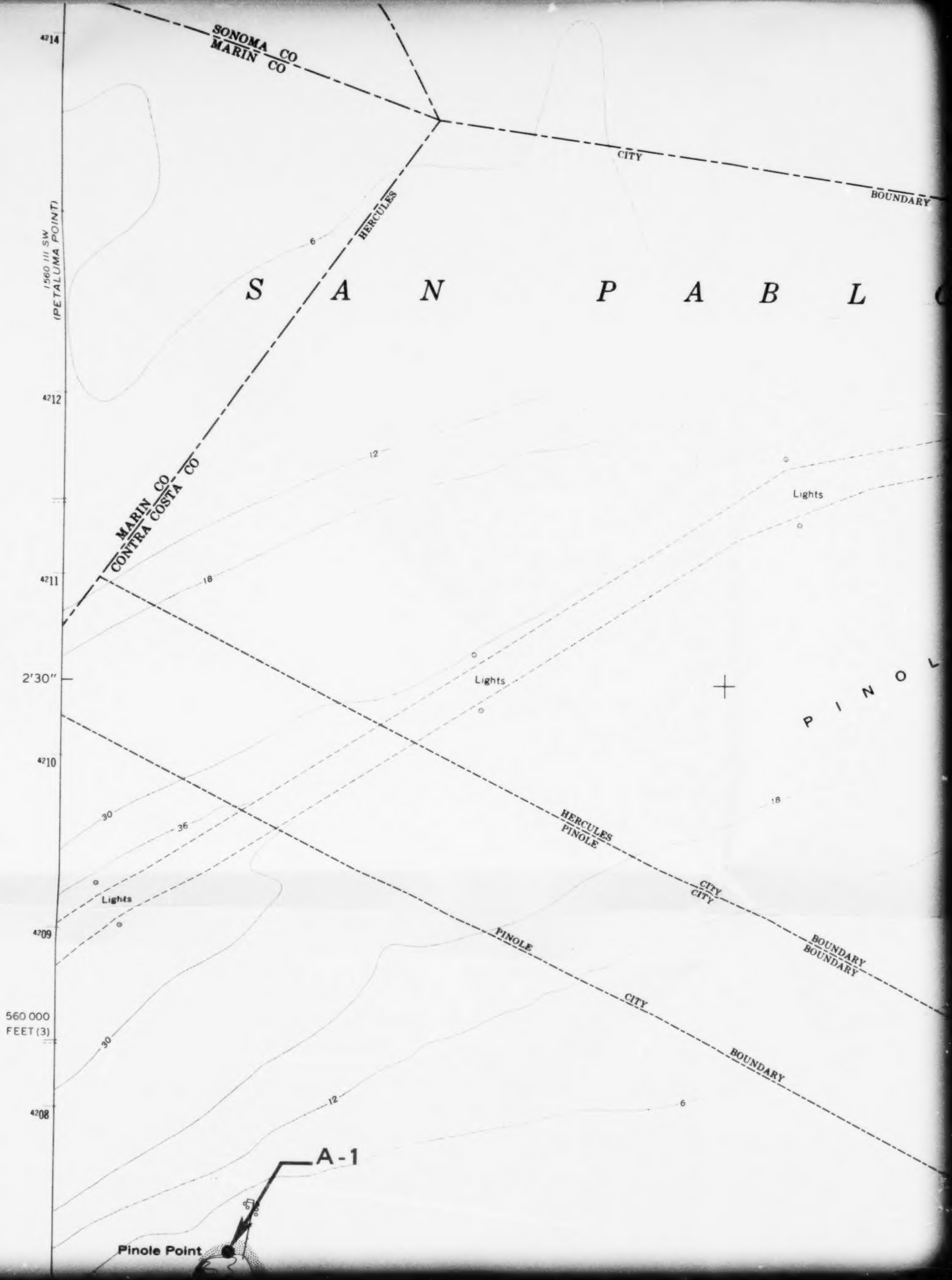
16 MI. TO U.S. 101
POINT (CALIF. 121) 8 MI.
1560 III NE
(CUTTINGS WHARF)
561
17'30"
R. 4 W.
563
1 490 000 FEET (3)
564
SE/
SACRAME
NAPA 13
37
8
BM 4
Island No 1
Salt Evaporators
Dutchman Slough
NAPA
Guadalcanal Village
NAVAL RES
SEARS POINT ROAD
9
BM 7
BM 9
RIVER
VALLEJO CITY BOUNDARY
MUD
16
15
NAVAL RES BDY
BM 20
BM 19
MARE ISLAND
Radio Towers
MARE NAVAL
FERRY
Radio Towers
Radar Target
RESERVATION
LEVEE
BM 11
BM 12
200
100
Beacon
MUD
Beacon

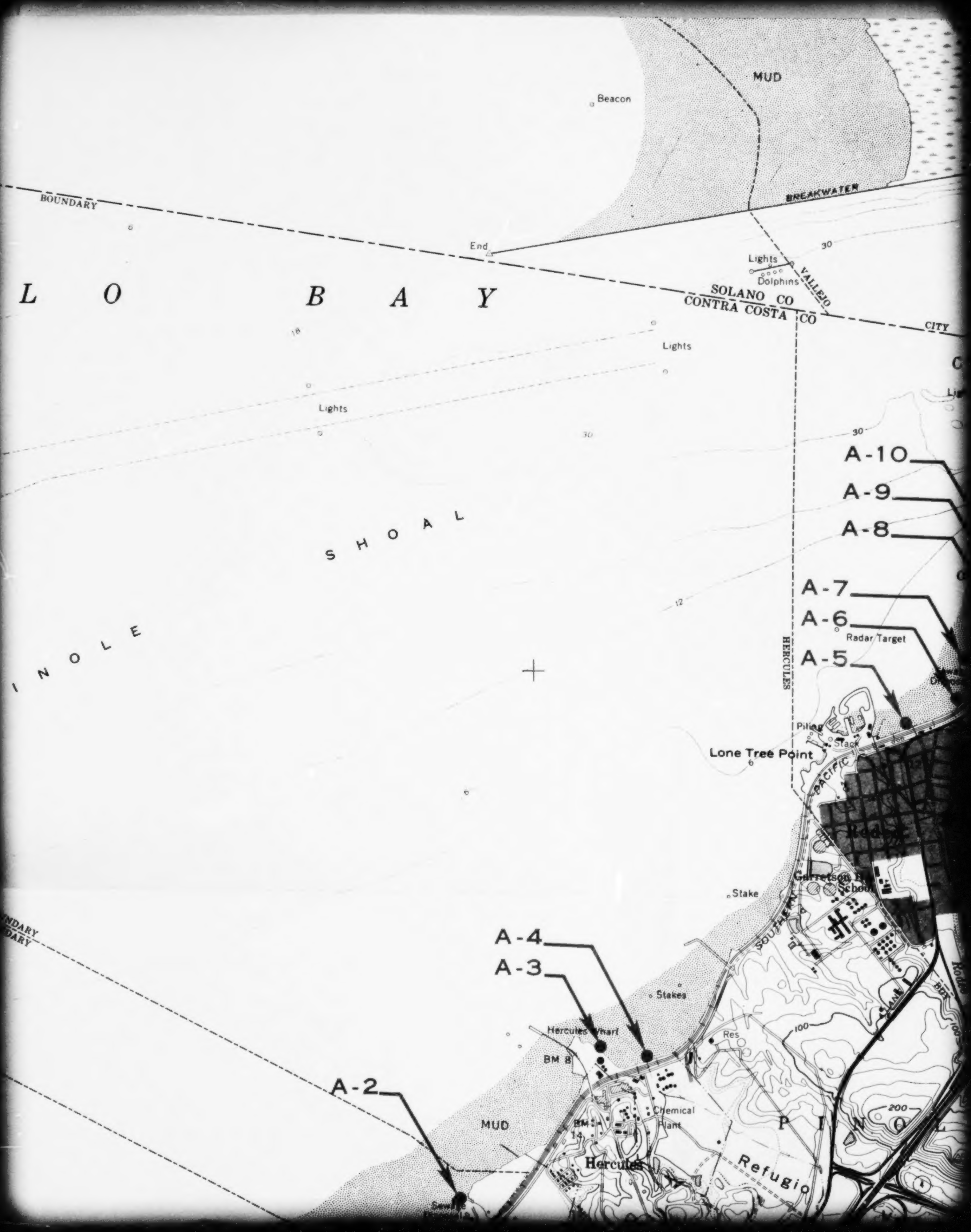
32-B

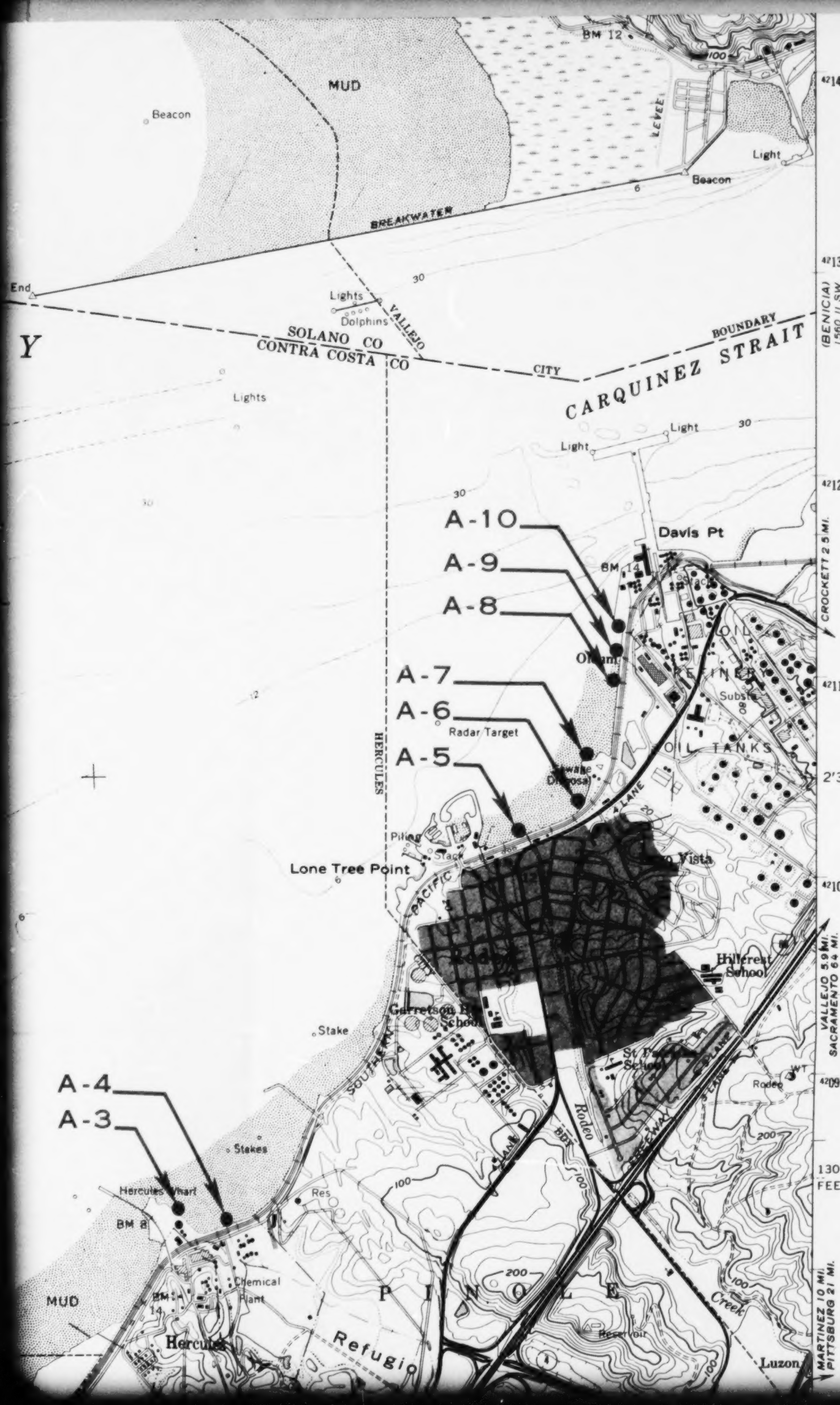
MARE ISLAND QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 MARE ISLAND 15' QUADRANGLE

1560 II NW (CORDELIA)

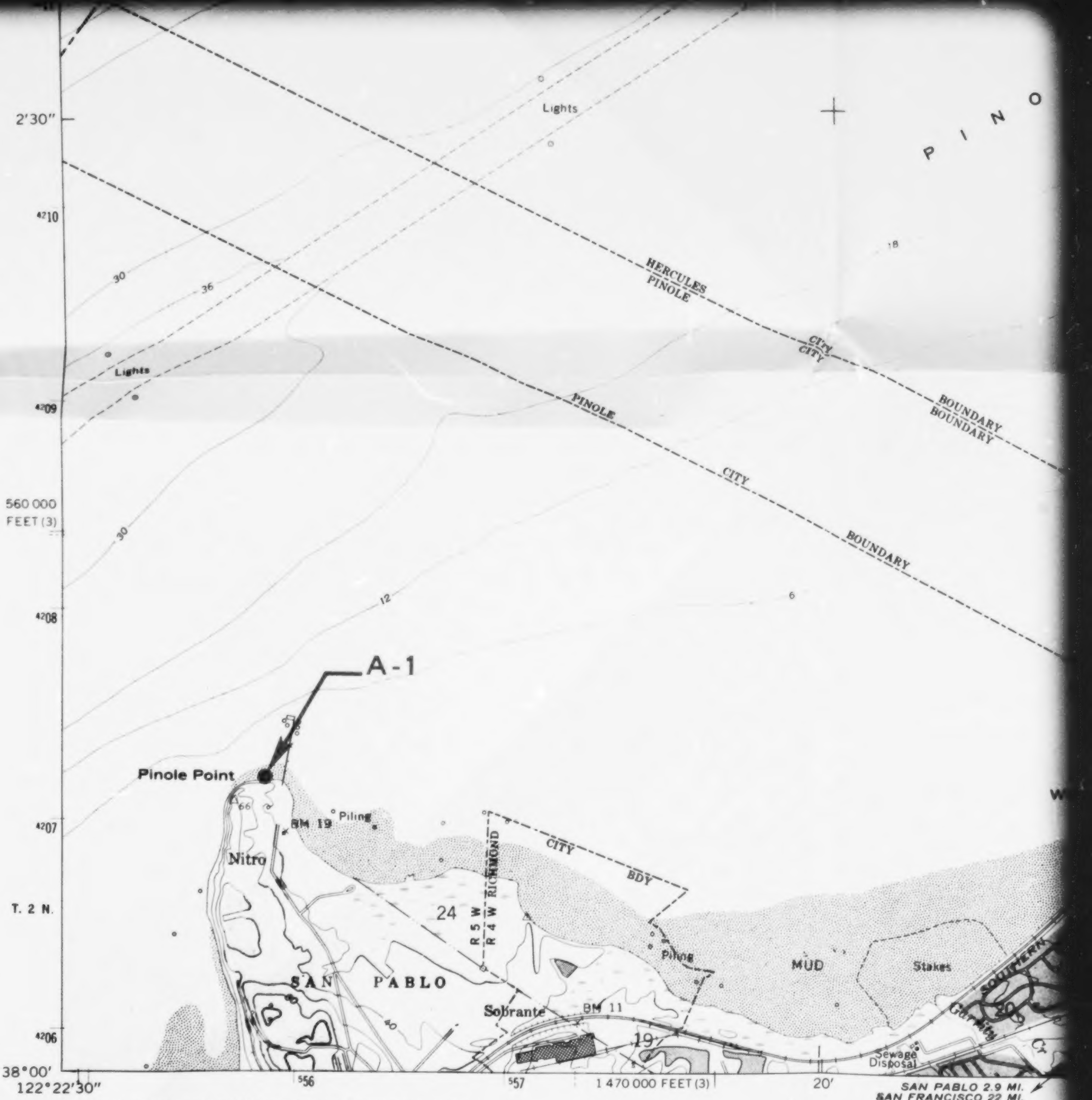

17'30"
R. 4 W.
563
1 490 000 FEET (3)
564
SACRAMENTO 56 MI.
NAPA 13 MI.
NAPA 13 MI.
122°15'
38°07'30"
Salt Evaporators
Dutchman Slough
Guadalcanal Village
NAVAL RES
NAPA RIVER
37
White Sl
Austin Cr
12
29
T. 3 N.
Sunrise Memorial Cem
Old Hillside Cem
KNAB
4219000m N.
BM 9
10
15
BM 20
BM 19
BM 12
MARE ISLAND STRAIT
BENICIA 7.5 MI.
4218
Park
590 000 FEET (3)
Radio Towers
MARE NAVAL RES
Mem Park
BM 8
BM 34
FERRY
Radio Towers
LEVEE
BM 11
29
4 LANE
7.9 MI. TO INTERSTATE 80
4216
Pipeline Area
BM 12
BM 23
200
GOLF COURSE
5'
4215
BM 22
Cem
200
BM 284
BM 128
BM 12
100
4214
MUD
Beacon


4214
SONOMA CO
MARIN CO
CITY
BOUNDARY
1560 III SW
(PETALUMA POINT)
HERCULES
6
S A N P A B L
4212
12
MARIN CO
CONTRA COSTA CO
Lights
4211
18
2'30"
Lights
P I N O L
4210
30
36
18
HERCULES
PINOLE
CITY
CITY
BOUNDARY
BOUNDARY
Lights
4209
PINOLE
CITY
BOUNDARY
560 000
FEET (3)
30
12
6
4208
A-1
Pinole Point


MUD
Beacon
BOUNDARY
BREAKWATER
End
30
Lights
Dolphins
VALLEJO
L O B A Y
SOLANO CO
CONTRA COSTA CO
CITY
18
Lights
Lights
30
30
A-10
A-9
A-8
S H O A L
12
A-7
A-6
Radar Target
I N O L E
HERCULES
A-5
Piling
Stack
Lone Tree Point
6
PACIFIC
Rodeo
Garretson Heights School
Stake
SOUTHERN
A-4
A-3
Stakes
Hercules Wharf
Res
BM 8
100
Chemical Plant
200
A-2
MUD
BM 14
Hercules
P I N O L E
Refugio
BOUNDARY



A-10
A-9
A-8
A-7
A-6
A-5
A-4
A-3
MUD
Beacon
BM 12
LEVEE
Light
Beacon
BREAKWATER
End
Lights
Dolphins
VALLEJO
SOLANO CO
CONTRA COSTA CO
CITY
BOUNDARY
CARQUINEZ STRAIT
Y
Lights
Light
Light
Davis Pt
BM 14
Oleum
OIL REFINERY
Substa
OIL TANKS
Radar Target
Sewage Disposal
HERCULES
Piling
Stack
Lone Tree Point
PACIFIC
SOUTHERN
Rodeo
Bayo Vista
Hillcrest School
Garretson Hts School
St Patricks School
Stake
Stakes
Hercules Wharf
BM 8
Res
Chemical Plant
BM 14
MUD
Hercules
P I N O L E
Refugio
Reservoir
Rodeo
Creek
Luzon
FREEWAY
WT
4214
4213
4212
4211
2'30"
4210
4209
130 000 FEET (2)
(BENICIA) 1560 II SW
CROCKETT 2.5 MI.
VALLEJO 5.9 MI. SACRAMENTO 64 MI.
MARTINEZ 10 MI. PITTSBURG 21 MI.


A-1
Pinole Point
2'30"
Lights
PINO
HERCULES
PINOLE
CITY
CITY
BOUNDARY
BOUNDARY
PINOLE
CITY
BOUNDARY
4210
4209
4208
4207
4206
560 000
FEET (3)
30
36
30
12
6
18
BM 19
Piling
Nitro
66
CITY
BDY
R 5 W
R 4 W
RICHMOND
24
T. 2 N.
SAN PABLO
Sobrante
BM 11
Piling
MUD
Stakes
SOUTHERN
19
Sewage Disposal
40
38°00'
122°22'30"
556
557
1 470 000 FEET (3)
20'
SAN PABLO 2.9 MI.
SAN FRANCISCO 22 MI.

(SAN QUENTIN)
1559 IV NW

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography from aerial photographs by photogrammetric methods and by planetable surveys 1948–49. Aerial photographs taken 1948 Revised from aerial photographs taken 1958. Field check 1959

Hydrography compiled from USC&GS charts 5525 and 5533 (1956)

Polyconic projection. 1927 North American datum
10,000-foot grids based on California coordinate system, zones 2 and 3
1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

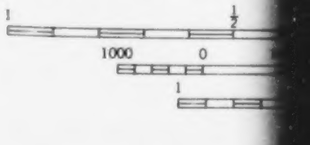
Red tint indicates areas in which only landmark buildings are shown

Unchecked elevations are shown in brown

Dashed land lines indicate approximate locations

GN
MN
0°25'
8 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



DEPTH CU
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TH

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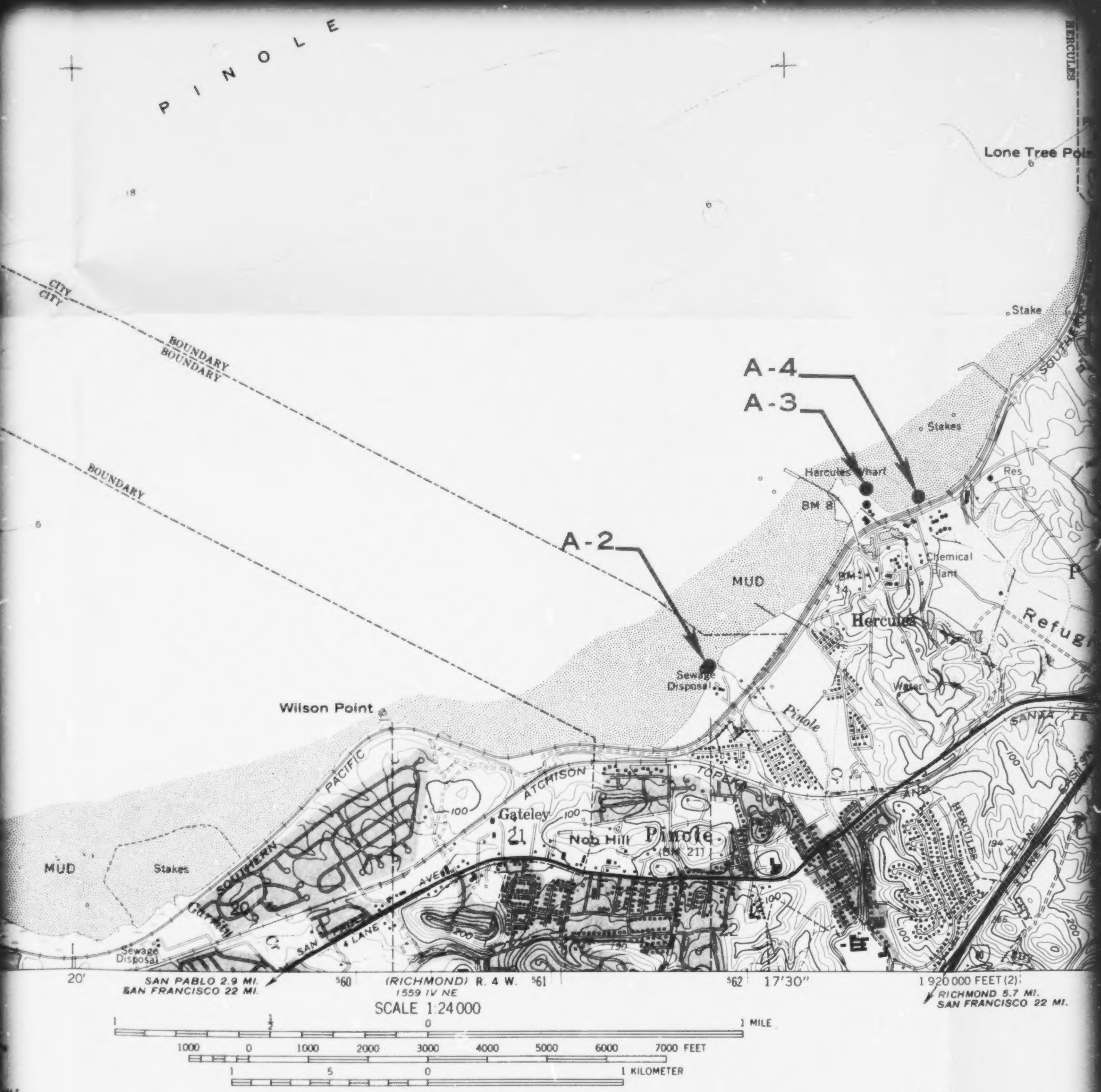

PINOLE
HERCULES
Lone Tree Point
Stake
A-4
A-3
Stakes
Hercules Wharf
Res
BM 8
A-2
Chemical Plant
MUD
BM 14
Hercules
Refugio
Sewage Disposal
Water
Wilson Point
Pinole Cr
SANTA FE
CITY BOUNDARY
BOUNDARY
SOUTHERN PACIFIC
ATCHISON TOPEKA AND
Gateley
Nob Hill
Pinole
(BM 21)
MUD
Stakes
Garrity Cr
SAN PABLO AVE
Sewage Disposal
HERCULES
20′
SAN PABLO 2.9 MI.
SAN FRANCISCO 22 MI.
560
(RICHMOND) R. 4 W.
1559 IV NE
561
562
17′30″
1 920 000 FEET (2)
RICHMOND 5.7 MI.
SAN FRANCISCO 22 MI.
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4 FEET

QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple compiled from aerial
taken 1968. This information not field checke

Purple tint indicates extension of urban areas

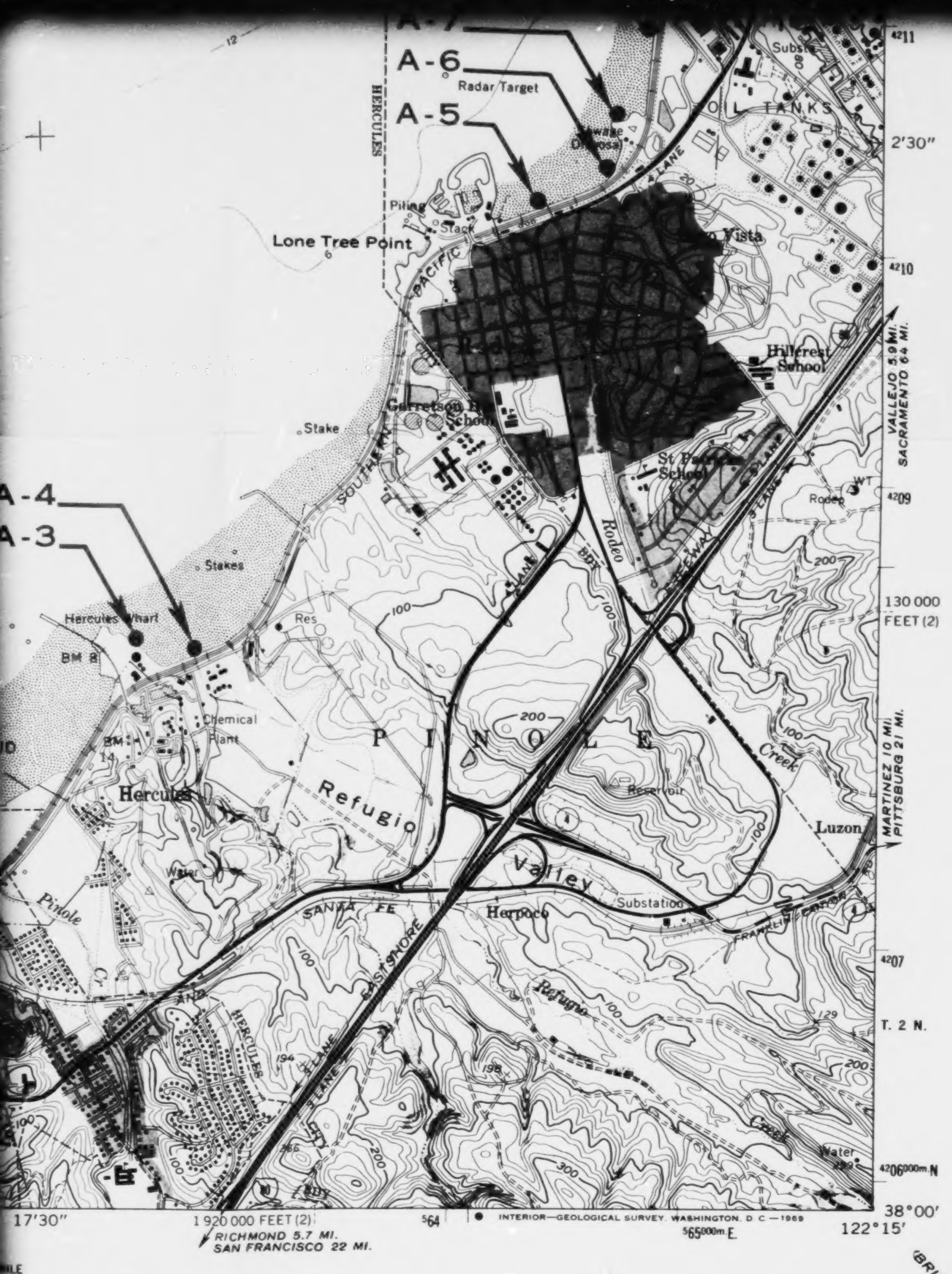

A-7
A-6
Radar Target
A-5
HERCULES
Sewage Disposal
OIL TANKS
Subst
2'30"
Piling
Stack
Lone Tree Point
PACIFIC
Bay Vista
4210
4211
Hillcrest School
Garretson Heights School
Stake
SOUTHERN
St Patricks School
Rodeo
A-4
A-3
Stakes
Hercules Wharf
BM 8
Res
Chemical Plant
BM 14
Hercules
P I N O L E
Refugio
Valley
Reservoir
Creek
Luzon
Water
Pinole
SANTA FE
Herpoco
Substation
EAST SHORE
FREEWAY
Refugio
Creek
HERCULES
130 000 FEET (2)
4209
4207
T. 2 N.
4206000m.N
VALLEJO 5.9 MI. SACRAMENTO 64 MI.
MARTINEZ 10 MI. PITTSBURG 21 MI.
17'30"
1 920 000 FEET (2)
RICHMOND 5.7 MI. SAN FRANCISCO 22 MI.
564
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D C —1969
565000m.E.
38°00'
122°15'
(BRIONES VALLEY) 1559 I NW

Figure 6.

QUADRANGLE LOCATION

MARE ISLAND, CALIF.
SE 4 MARE ISLAND 15' QUADRANGLE
N3800—W12215/7.5

1959
PHOTOREVISED 1968
AMS 1560 III SE—SERIES V895

Revisions shown in purple compiled from aerial photographs taken 1968. This information not field checked

Purple tint indicates extension of urban areas

Thermal Field
Pinole Point

Figure 7. Thermal Field Near Pinole Point

XXXXXXXXXXXXXXXXXXXXXXX
following pages
detail.
XXXXXXXX

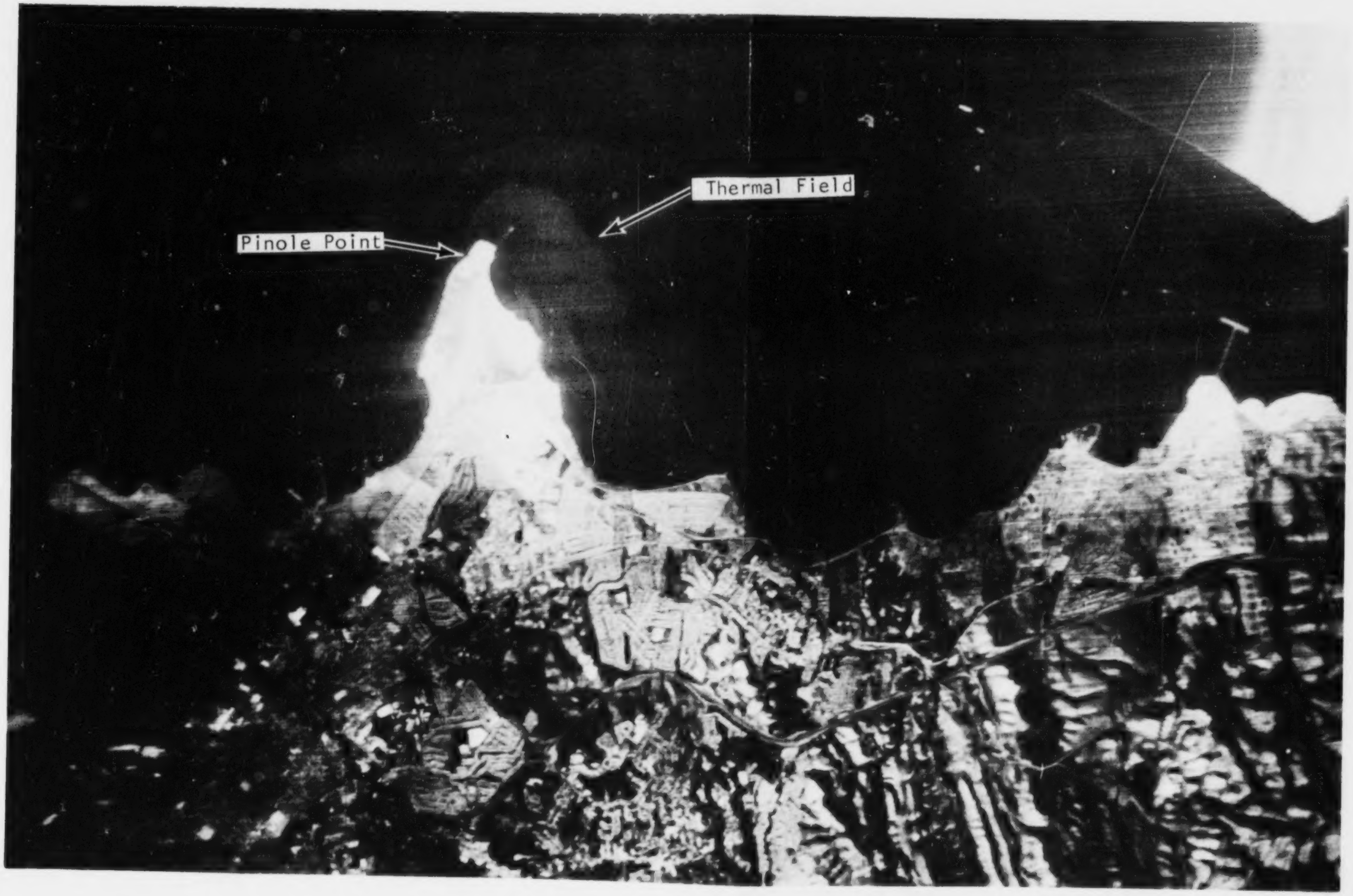

Pinole Point
Thermal Field

Figure 7. Thermal Field Near Pinole Point

July - West of center on the end of Pinole Point was an area displaying the characteristics of an active outfall. The water was reddish-brown in this area. This discoloration extended eastward.

A-2 April - Characteristics of a sub-surface outfall off shore from an STP were detected at this location as evidenced by pronounced changes in the surface wave pattern. No discoloration was discerned. The outfall appeared to be inactive at the time of flight.

July - Grayish-brown water in the vicinity of this outfall appeared to be altering the capillary wave patterns that was predominant throughout this area.

A-3 April - There was a small active outfall immediately above the water's surface. No discoloration in the receiving water was associated with the effluent from this outfall.

July - Identical indication was recorded.

"July Night" - A small thermal plume measuring approximately 6.1 meters by 6.1 meters (20 ft by 20 ft) was recorded at this location.

A-4 April - A ditch 7.3 meters (24 feet) wide and containing yellowish-brown water, was discharging into Pablo Bay. The water dispersed quickly and no plume was subsequently generated by this discharge.

July - An identical indication was recorded. Algal mats were located off-shore in the general vicinity.

A-5 & -6 April - Daytime thermal imagery recorded hot discharges from these two locations. The thermal plume that was generated combined with similar plumes from A-8, A-9, and A-10 and extended 305 meters (1,000 ft) from shore and approximately 915 meters (3,000 ft) northward to the pier on Davis Point as shown in Figure 8.

A-7 April - A small active surface level outfall was detected at this point. There appeared to be no discoloration to the receiving waters.

July - The outfall was active at this time with no discoloration recorded.

"July Night" - A warm effluent was being discharged from this outfall. The wastewater submerged quickly. There was a small cold thermal field in the immediate area as shown in Figure 9.

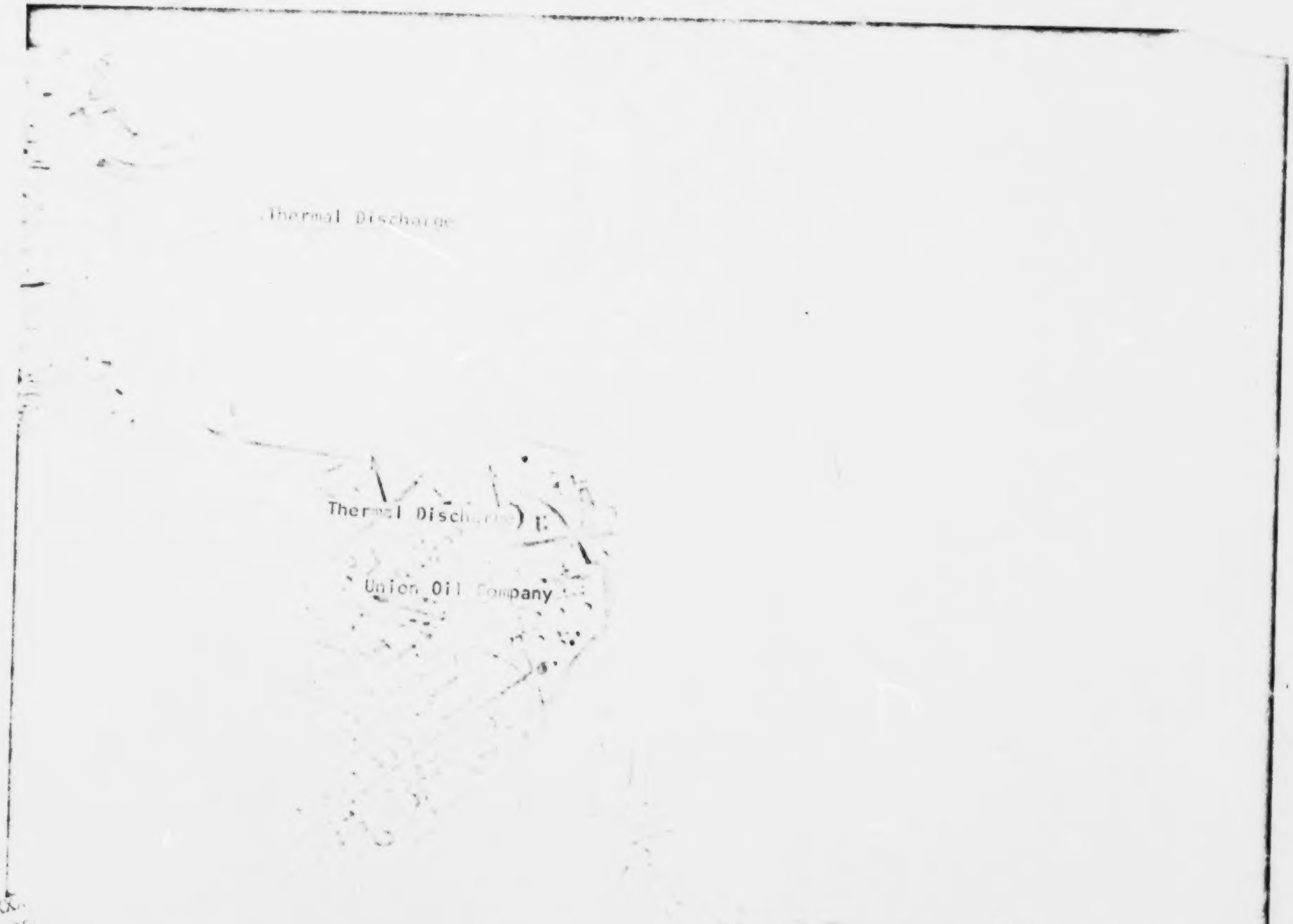
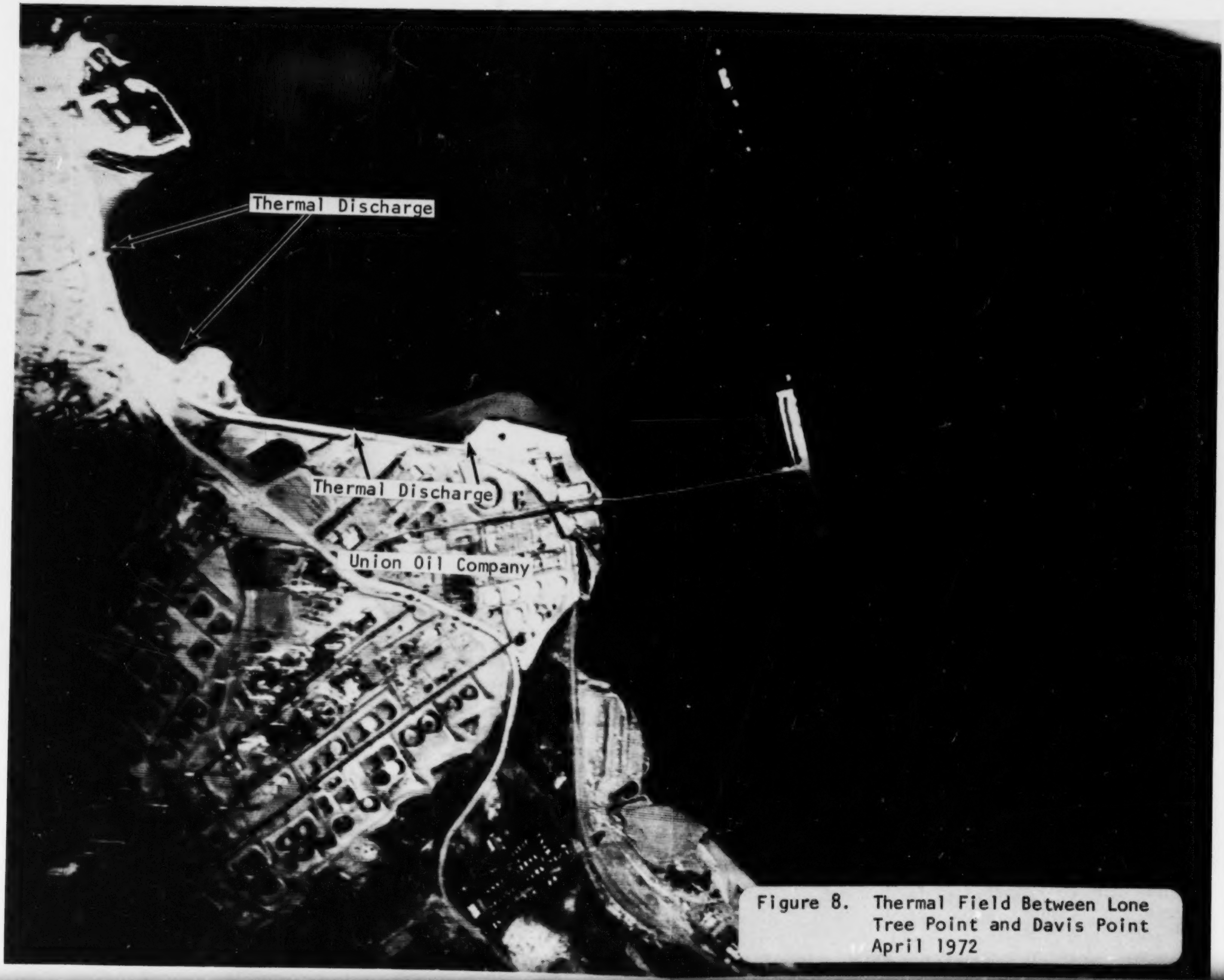

Thermal Discharge
Thermal Discharge
Union Oil Company

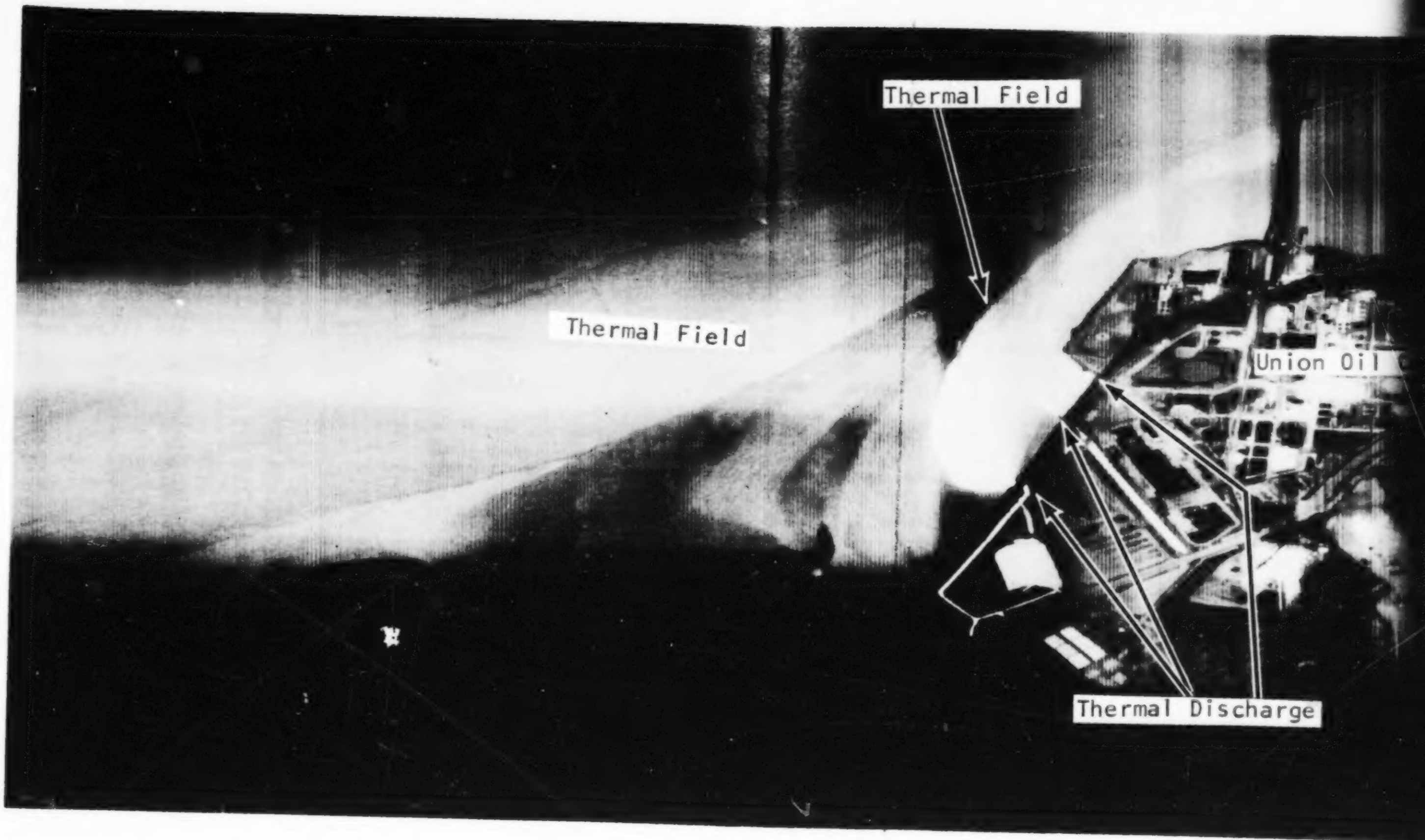
Figure 8. Thermal Field Between Lone Tree Point and Davis Point April 1972

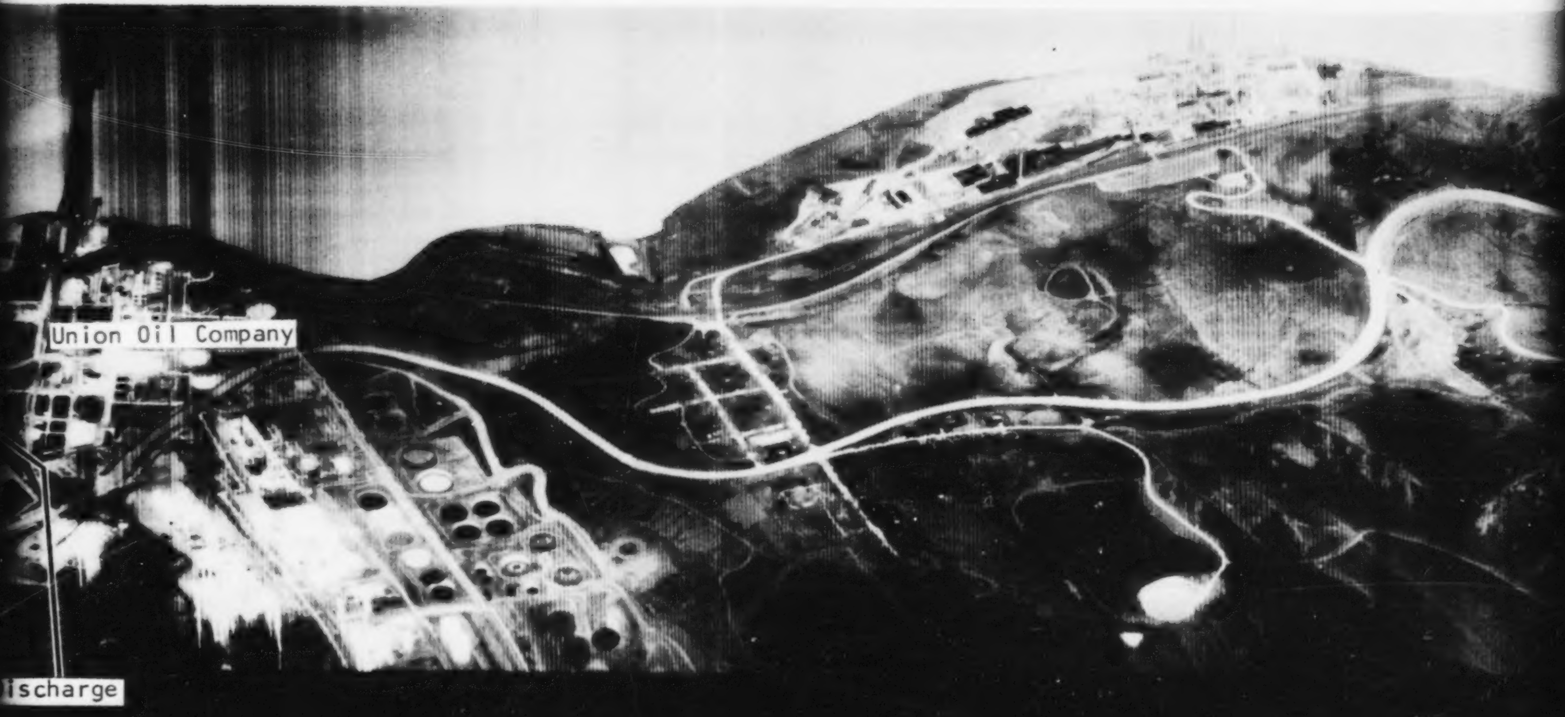
XXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXX

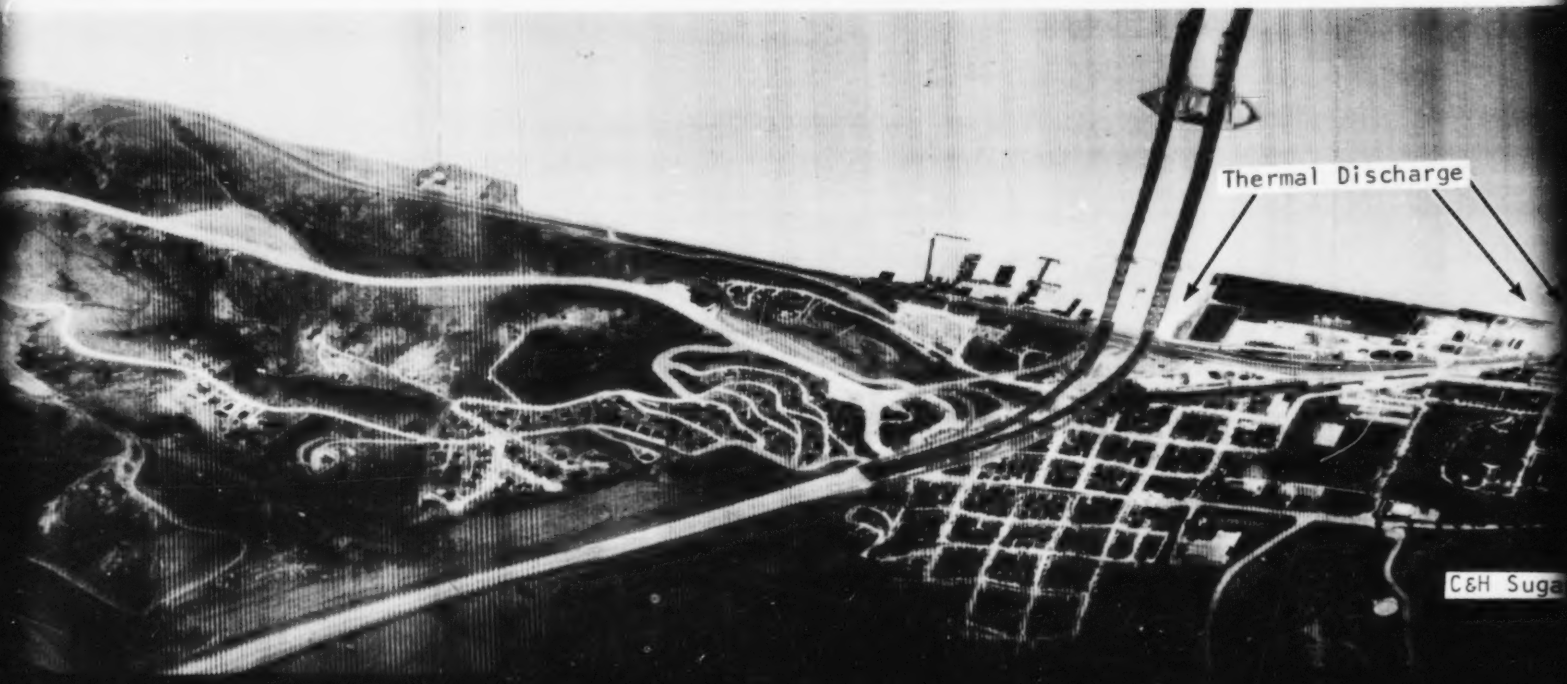


Thermal Discharge
Thermal Discharge
Union Oil Company

Figure 8. Thermal Field Between Lone Tree Point and Davis Point April 1972


Thermal Field
Thermal Field
Union Oil
Thermal Discharge


Union Oil Company
ischarge


Thermal Discharge
C&H Suga

34-b

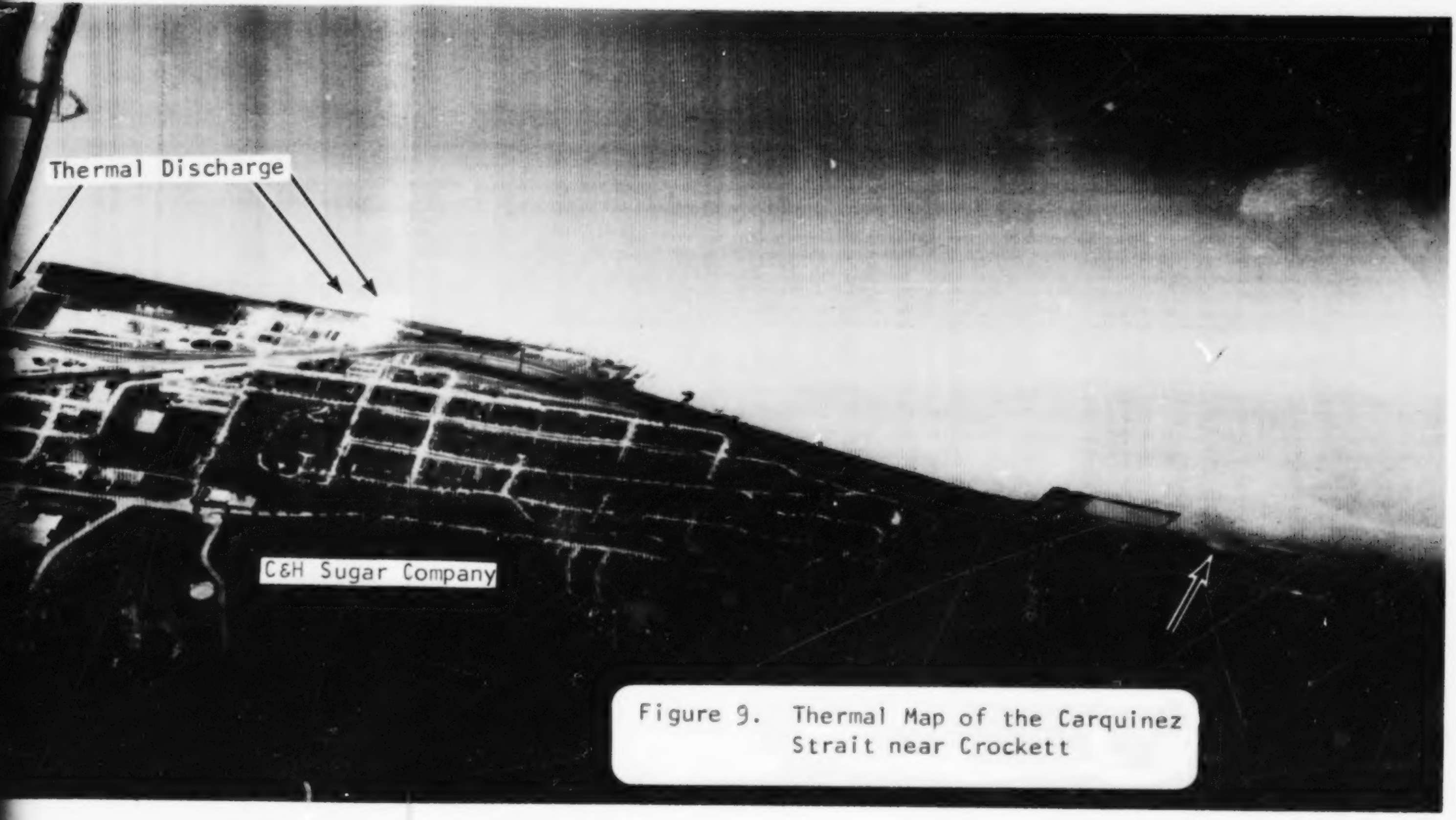

Thermal Discharge
C&H Sugar Company

Figure 9. Thermal Map of the Carquinez Strait near Crockett

A-8 April - An effluent of warm water was being discharged through a concrete structure (4.6 meters wide and extending 9.2 meters out into the water) from a series of ditches originating within the Union Oil Company. This is shown in Figure 8. This discharge produced no apparent discoloration in the receiving Bay waters.

July - An identical indication was recorded. The thermal map is shown in Figure 10.

"July Night" - A large thermal plume was generated by this point of discharge. It is shown in Figure 9.

A-9 April - This discharge was active at the time of flight. It produced no discoloration in the Bay waters. The thermal map, Figure 8, indicates that the water temperature of this effluent was somewhat cooler than that of A-8. This is shown by the small tear-drop shaped thermal field in Figure 8. This was recorded at a point in time approximately one hour prior to the crest of low-high tide. Figure 8 shows that the thermal field was being carried toward the Davis Point dock.

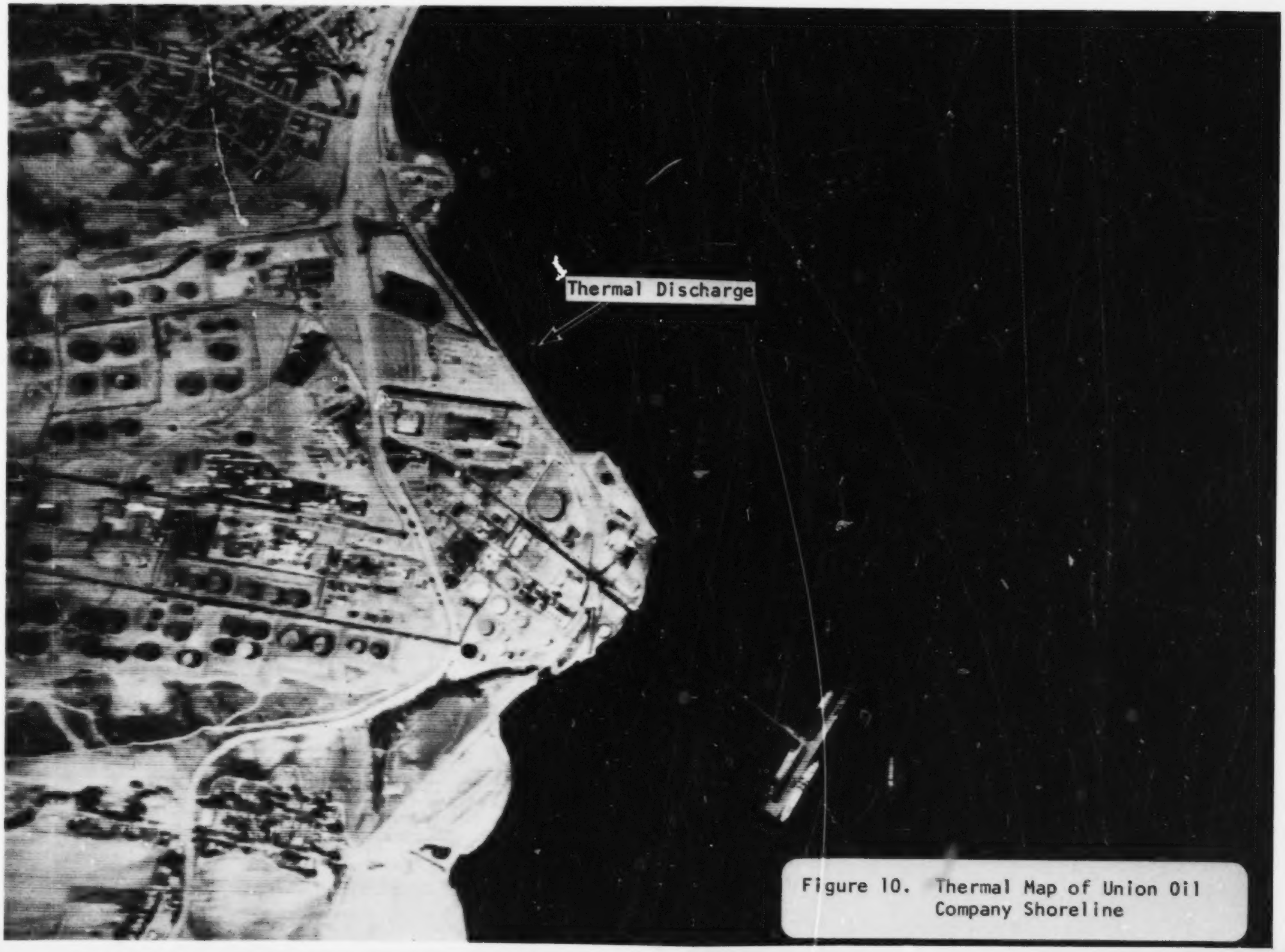

Thermal Discharge

Figure 10. Thermal Map of Union Oil Company Shoreline

July - The outfall was active at the time of flight. The temperature of the discharge was nearly equal to that of the Bay waters in this immediate area. No thermal plume from this outfall is seen in Figure 10.

"July Night" - This outfall was discharging hot water at the time of this night mission as shown in Figure 9. It was recorded approximately 0.5 hours after the crest of high-high tide in this area.

A-10 April - This outfall, reportedly within the Union Oil Company facility, was discharging warm water at the time of flight. This is shown by the arrow on the far right-hand side in Figure 8. A smaller tear-drop phenomenon, than that discussed above, was recorded in this immediate area.

July - The outfall was also active during this mission. The temperature of the effluent was close to that of the receiving Bay waters.

"July Night" - This outfall was discharging hot water at the time of flight. The thermal discharges, labeled A-8, A-9, and A-10, combined to form a large thermal field that extended 305 meters (1,000 feet) out into the Bay and 915 meters (3,000 feet) northward to the pier at Davis Point.

Again, high-high tide had crested 0.5 hours prior to the recording of the thermal map in Figure 9. The influx of water into this area carried the thermal field northward or toward the bottom of the page.

NOTE: Indication numbers A-11 through A-22 appear on Figure 11, the Benicia map.

A-11 April - Characteristics of a subsurface discharge were recorded at this location. It produced no apparent discoloration in the receiving water.

July - Same indication as April.

A-12 April - A ditch carrying a reddish-brown wastewater, was discharging into the Carquinez Strait at the time of flight. This ditch, approximately 6.1 meters (20 feet) wide, exited from under the railway tracks on the southern side of the C&H Sugar Company facility and emptied into the Strait along the eastern side of the Carquinez Bridge as shown in Figure 11. The source(s) of the discharge could not be determined.

July - Identical indication was recorded.

"July Night" - This ditch was discharging warm water at the time of flight. This is shown in Figure 9.

37-A

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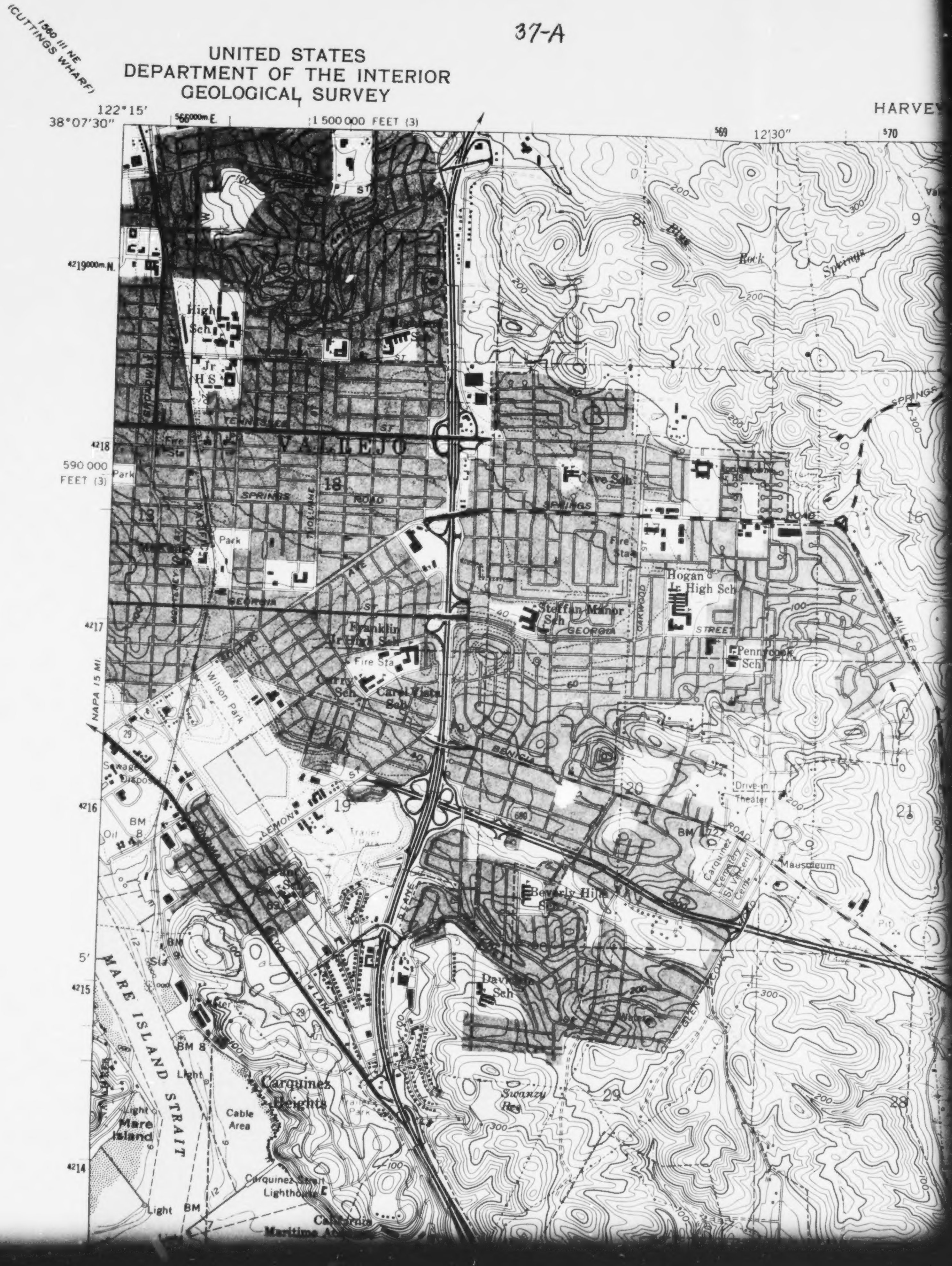
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY


1560 III NE
(CUTTINGS WHARF)
122°15'
38°07'30"
566000m E.
1 500 000 FEET (3)
569
12'30"
570
HARVEY
4219000m N.
4218
590 000
FEET (3)
4217
4216
5'
4215
4214
NAPA 15 MI.
VALLEJO
High Sch
Jr HS
Fire Sta
Park
TENNESSEE ST
SPRINGS ROAD
TUOLUMNE
GEORGIA ST
Franklin Jr High Sch
Fire Sta
Curry Sch
Carol Vista Sch
Wilson Park
Sewage Disposal
BM 8
Oil
LEMON ST
Trailer Park
Grant Sch
Cave Sch
Fire Sta
Hogan Jr High Sch
Steffan Manor Sch
Pennycook Sch
OAKWOOD
BENICIA ROAD
Drive-in Theater
BM 72
Carquinez Cemetery
St Vincent Cem
Mausoleum
Beverly Hills Sch
Davidson Sch
Water
GLEN COVE
Swanzy Res
MILLER
Big Rock Springs
MARE ISLAND STRAIT
Mare Island
Light
BM 9
BM 8
Carquinez Heights
Cable Area
Carquinez Strait Lighthouse
California Maritime Academy
680
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19
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21
28
29
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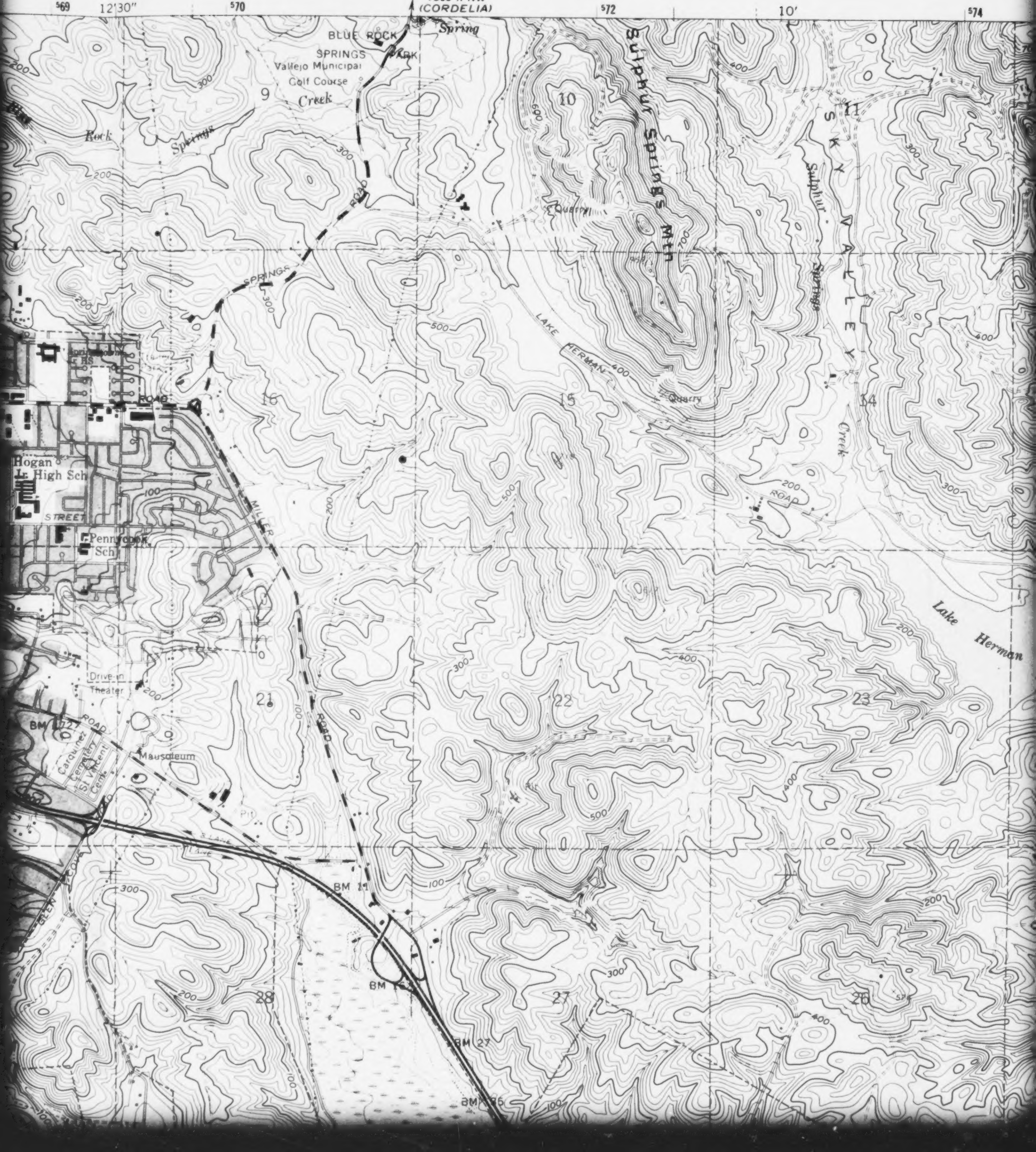
HARVEY O. BANKS, DIRECTOR OF WATER RESOURCES


569
12'30"
570
1560 II NW
(CORDELIA)
572
10'
574
BLUE ROCK
SPRINGS
PARK
Spring
Vallejo Municipal
Golf Course
9
Creek
Rock
Springs
10
Sulphur Springs Mtn
11
SKY VALLEY
Sulphur
Springs
Creek
Quarry
SPRINGS
ROAD
LAKE HERMAN
ROAD
16
15
14
Hogan
Jr. High Sch
STREET
Pennycook
Sch
MILLER
ROAD
Lake Herman
Drive-in
Theater
21
22
23
BM 172
Carquinez
Cemetery
St Vincent
Cem
Mausoleum
Pit
BM 11
BM 15
BM 27
BM 26
28
27
26
GLEN COVE
100
200
300
400
500
600
700

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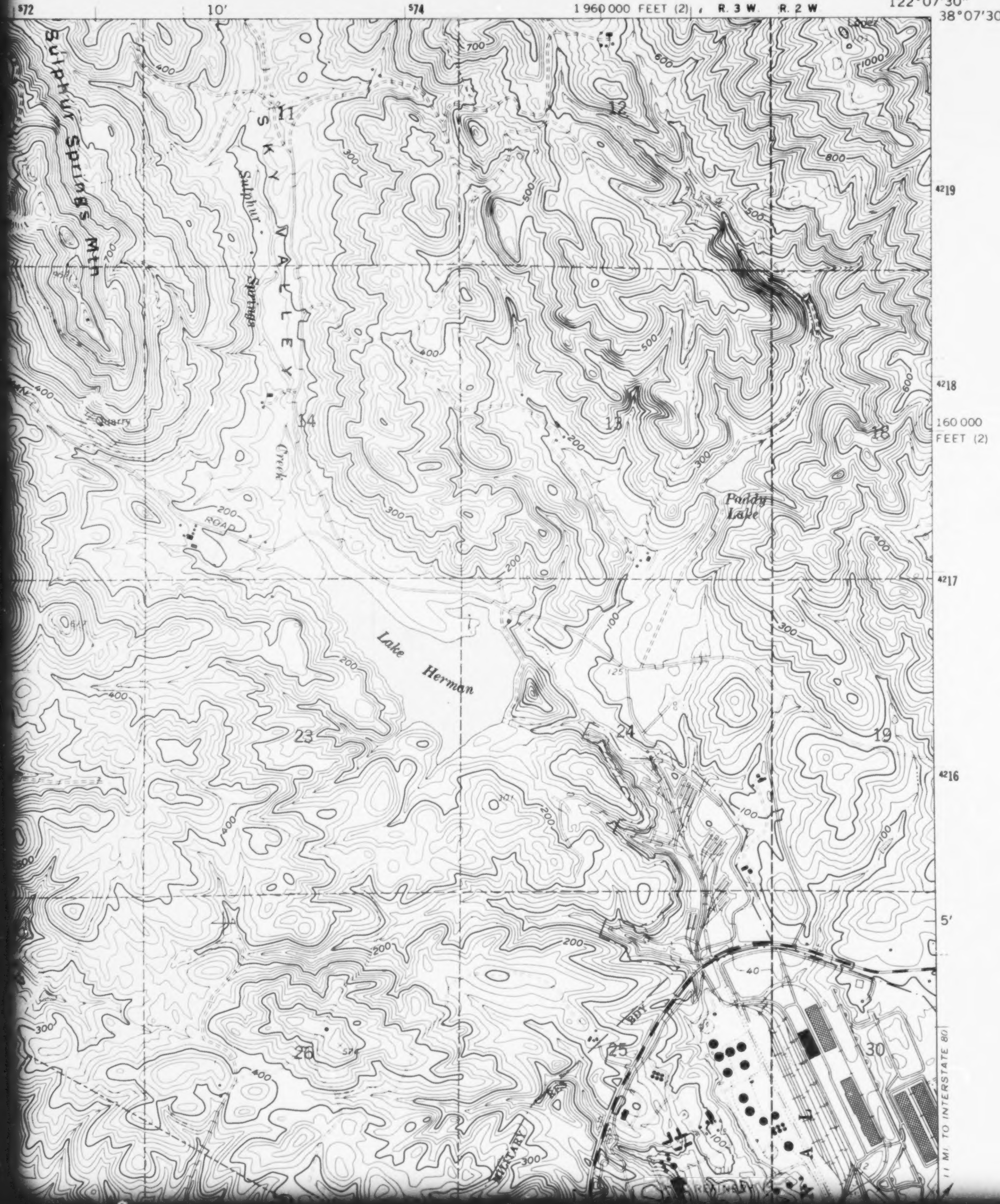
RESOURCES

BENICIA QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 CARQUINEZ STRAIT 15' QUADRANGLE


1560 II NE
(FAIRFIELD SOUTH)
572
10'
574
1 960 000 FEET (2)
R. 3 W.
R. 2 W.
122°07'30"
38°07'30"
4219
4218
160 000
FEET (2)
4217
4216
5'
11 MI. TO INTERSTATE 80
Sulphur Springs Mtn
SKY VALLEY
Sulphur Springs
Creek
Quarry
ROAD
Paddy Lake
Lake Herman
MILITARY
BDY
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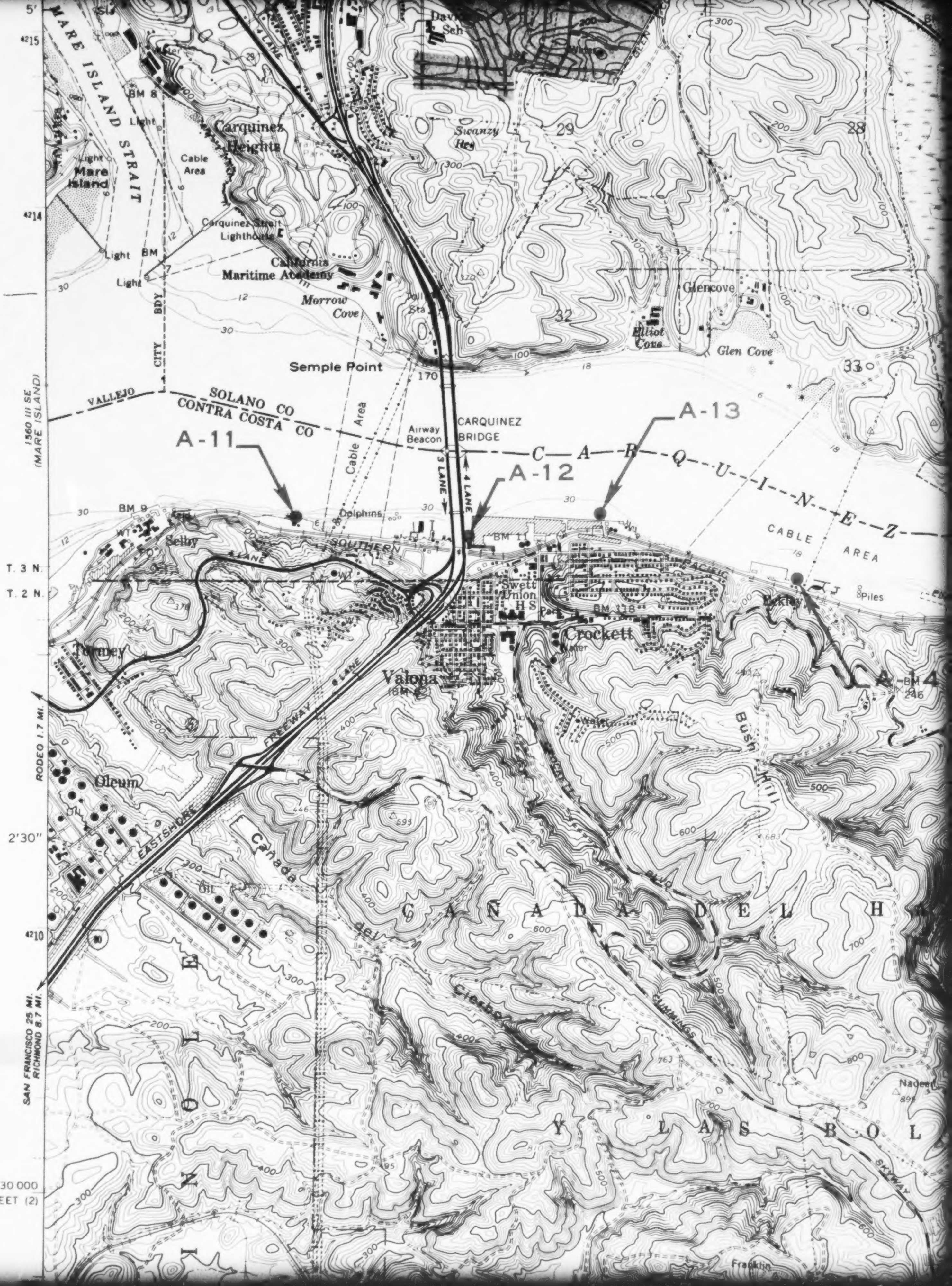
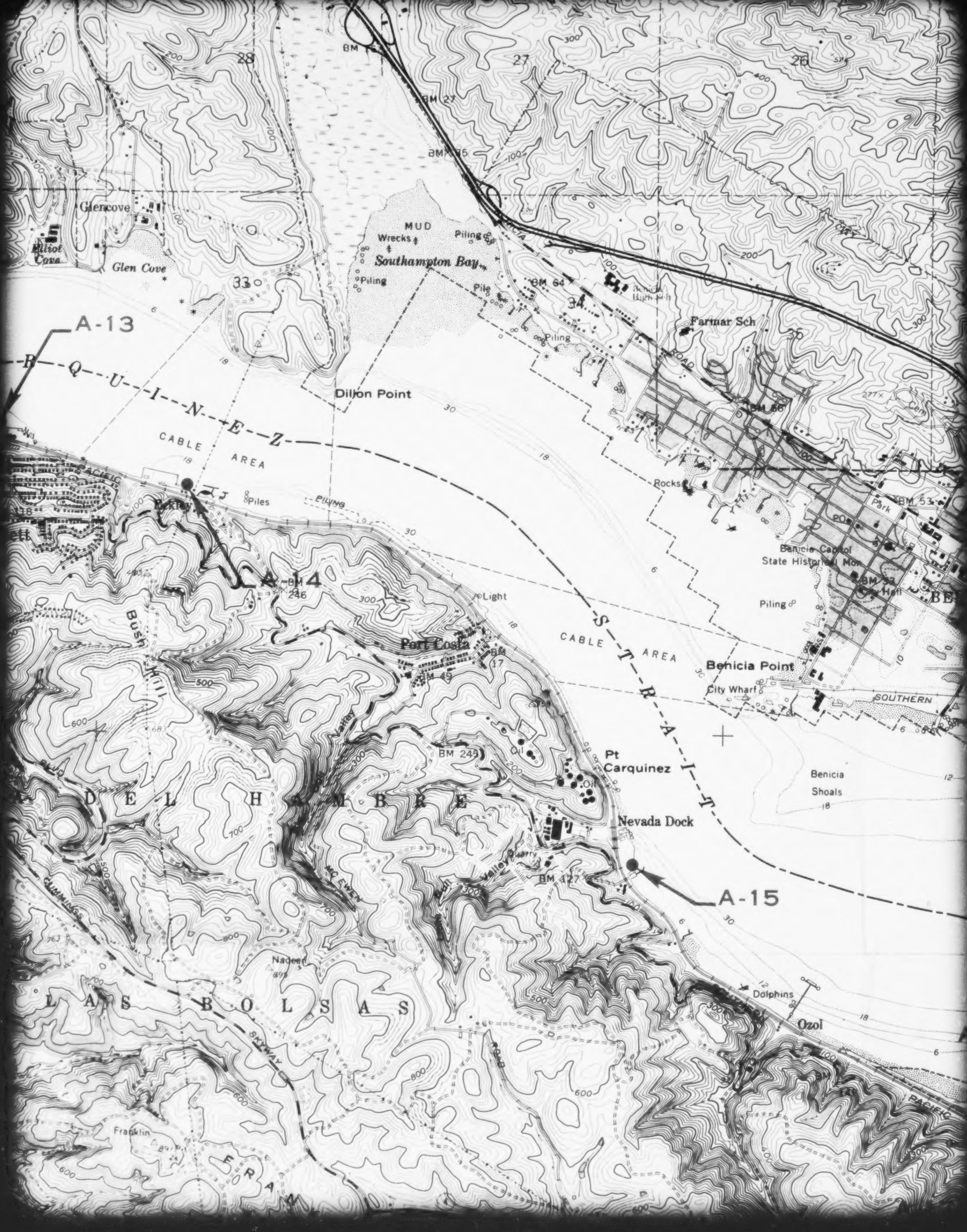

A-11
A-12
A-13
A-14
MARE ISLAND STRAIT
Mare Island
Carquinez Heights
Cable Area
Carquinez Strait Lighthouse
California Maritime Academy
Morrow Cove
Swanzy Res
Glencove
Elliot Cove
Glen Cove
Semple Point
VALLEJO
CITY BDY
SOLANO CO
CONTRA COSTA CO
Airway Beacon
CARQUINEZ BRIDGE
C A R Q U I N E Z
CABLE AREA
Dolphins
SOUTHERN
PACIFIC
Selby
Swett Union H S
Crockett
Valona
Eckley
Piles
Bush Hill
Tormey
Oleum
EASTSHORE FREEWAY
Canada del
C A N A D A D E L H
Y L A S B O L
CUMMINGS SKYWAY
Nadeen
Franklin
T. 3 N.
T. 2 N.
RODEO 1.7 MI.
SAN FRANCISCO 25 MI. RICHMOND 8.7 MI.
1560 III SE (MARE ISLAND)
130 000 FEET (2)
2'30"
5'
4215
4214
4210
BM 8
BM 9
BM 11
BM 118
BM 246
170
29
28
32
33


A-13
A-14
A-15
Glencove
Elliot Cove
Glen Cove
MUD
Wrecks
Piling
Southampton Bay
Pile
Dillon Point
CARQUINEZ STRAIT
CABLE AREA
Piles
PILING
Light
Port Costa
Bush Hill
BM 246
BM 49
BM 17
BM 249
Oil
Pt Carquinez
Nevada Dock
BM 127
Benicia High Sch
Farmar Sch
ROAD
BM 64
BM 66
BM 27
BM 36
Rocks
Park
PO
BM 53
Benicia Capitol State Historical Mon
BM 33 City Hall
Piling
Benicia Point
City Wharf
SOUTHERN
PACIFIC
Benicia Shoals
Dolphins
Ozol
DEL HAMBRE
LAS BOLSAS
Nadeen
Franklin
CUMMINGS
SKYWAY
ERAM
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27
26
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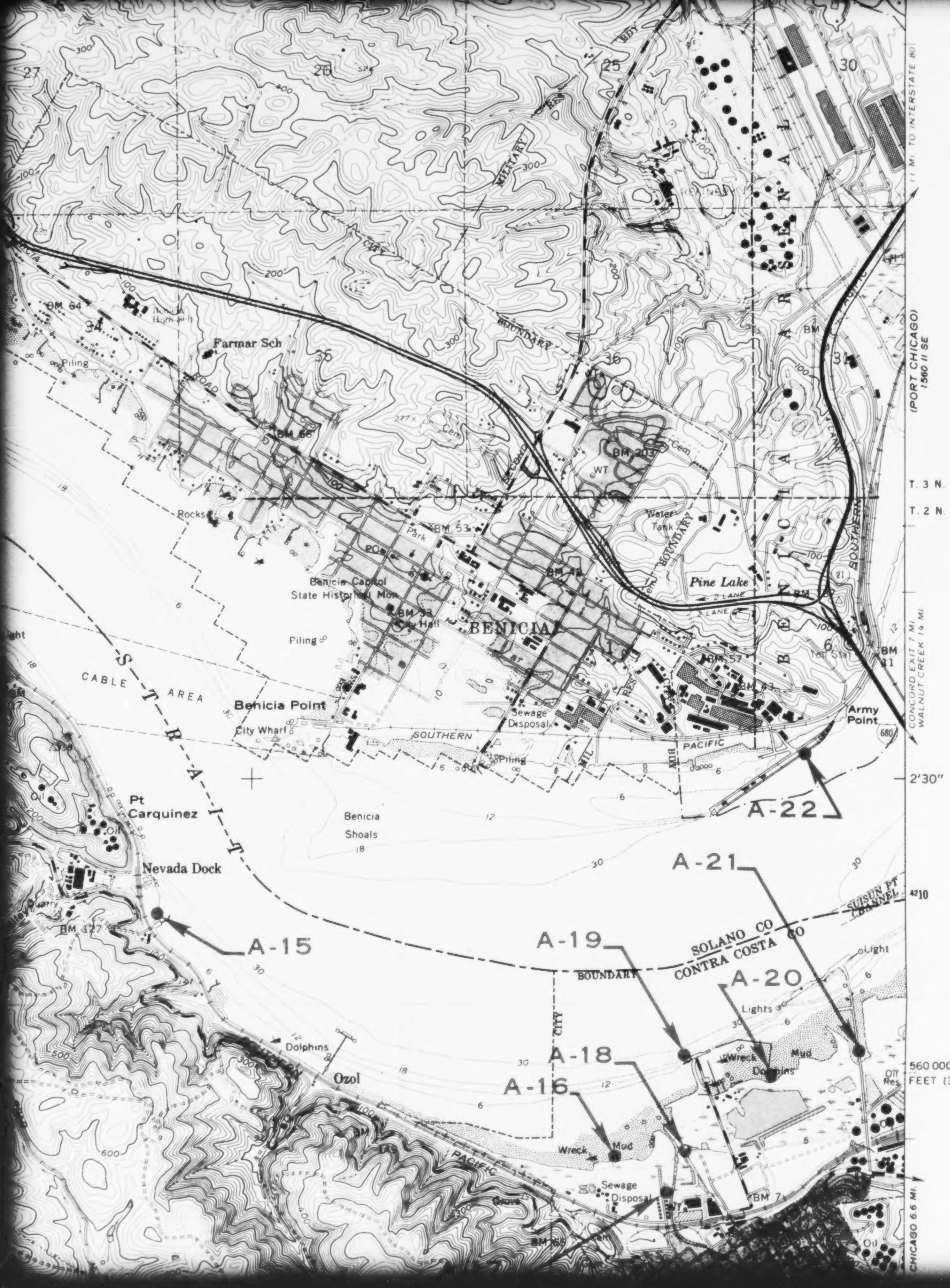
35


A-15
A-16
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A-19
A-20
A-21
A-22
BENICIA
Benicia Point
Benicia Shoals
Benicia Capitol State Historical Mon
City Wharf
Army Point
Pine Lake
Farmar Sch
Benicia High Sch
Pt Carquinez
Nevada Dock
Ozol
Dolphins
Wreck
Mud
Sewage Disposal
Lights
Light
Oil
Piling
Rocks
Park
Cem
Water Tank
WT
Toll Stat
CABLE AREA
STRAIT
SOLANO CO
CONTRA COSTA CO
BOUNDARY
CITY BOUNDARY
MILITARY RES
SOUTHERN PACIFIC
SUISUN PT CHANNEL
BENICIA ARSENAL
T. 3 N.
T. 2 N.
2'30"
4210
560 000 FEET (3)
(PORT CHICAGO) 1560 II SE
CONCORD EXIT 7 MI. WALNUT CREEK 14 MI.
11 MI. TO INTERSTATE 80
CHICAGO 6.6 MI.
680
21
BM 64
BM 56
BM 53
BM 203
BM 57
BM 127
BM 7
27
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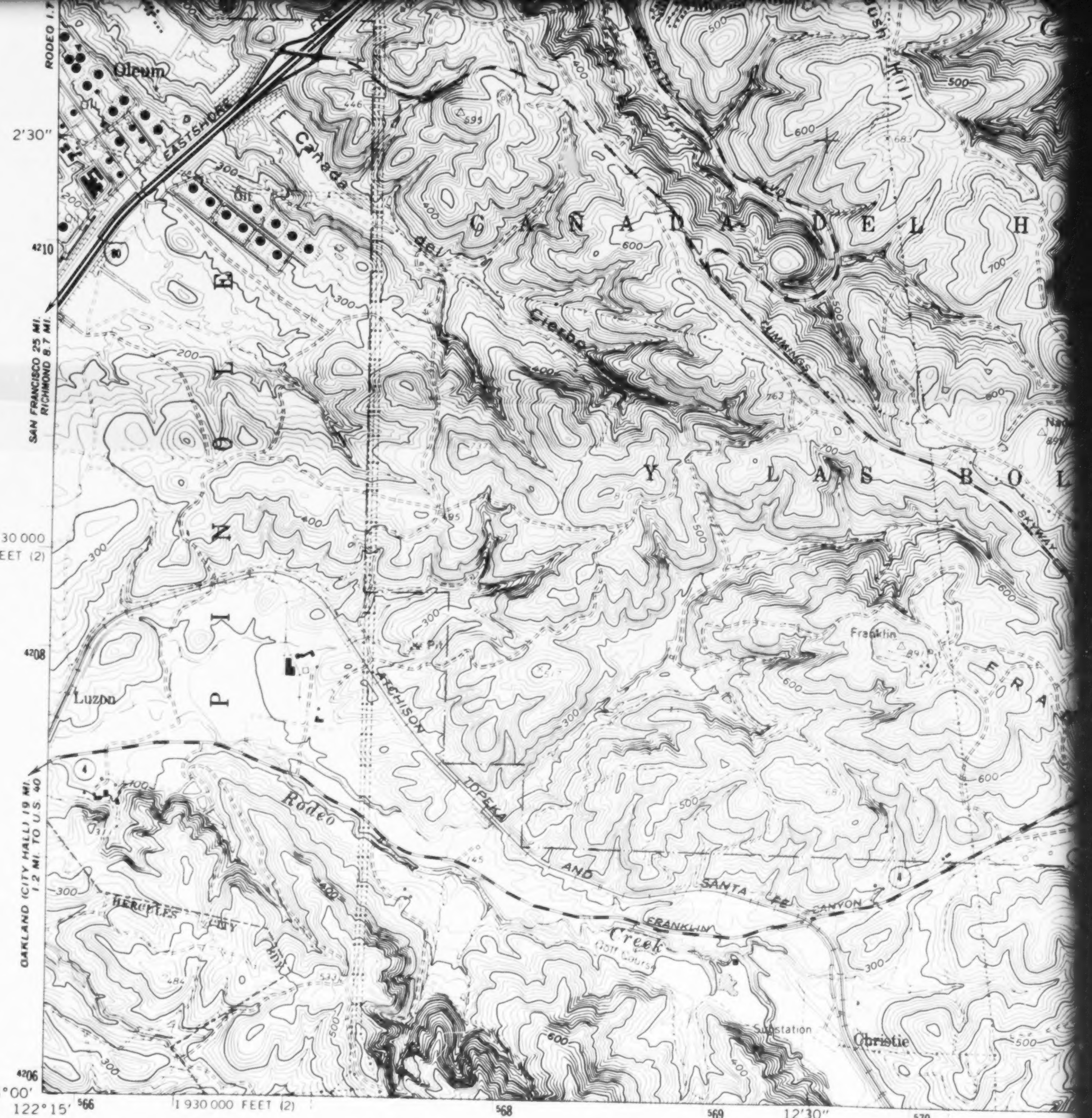
RODEO 1.7
Oleum
EASTSHORE
2'30"
Canada del Cierbo
C A N A D A D E L H
Bush Hill
CUMMINGS
4210
SAN FRANCISCO 25 MI.
RICHMOND 8.7 MI.
P I N O L E
Y L A S B O L
SKYWAY
130 000
FEET (2)
Franklin
4208
Luzon
ATCHISON TOPEKA AND SANTA FE
E R A
Rodeo Creek
FRANKLIN CANYON
OAKLAND (CITY HALL) 19 MI.
1.2 MI. TO U.S. 40
HERCULES CITY
Golf Course
Substation
Christie
4206
38°00'
122°15'
566
1 930 000 FEET (2)
568
569
12'30"
570

(RICHMOND)
1559 IV NE

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1948 and 1958
Revised from aerial photographs taken 1958. Field check 1959

Hydrography compiled from USC&GS charts 5525 (1956),
5534, and 5574 (1958)

Polyconic projection. 1927 North American datum
10,000-foot grids based on California coordinate system, zones 2 and 3
1000-meter Universal Transverse Mercator grid ticks,
zone 10, shown in blue

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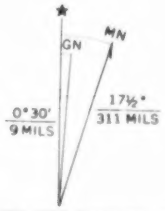
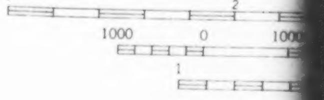

GN
MN
0°30'
9 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET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½
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DEPTH CURVES
SHORELINE SHOWN
THE

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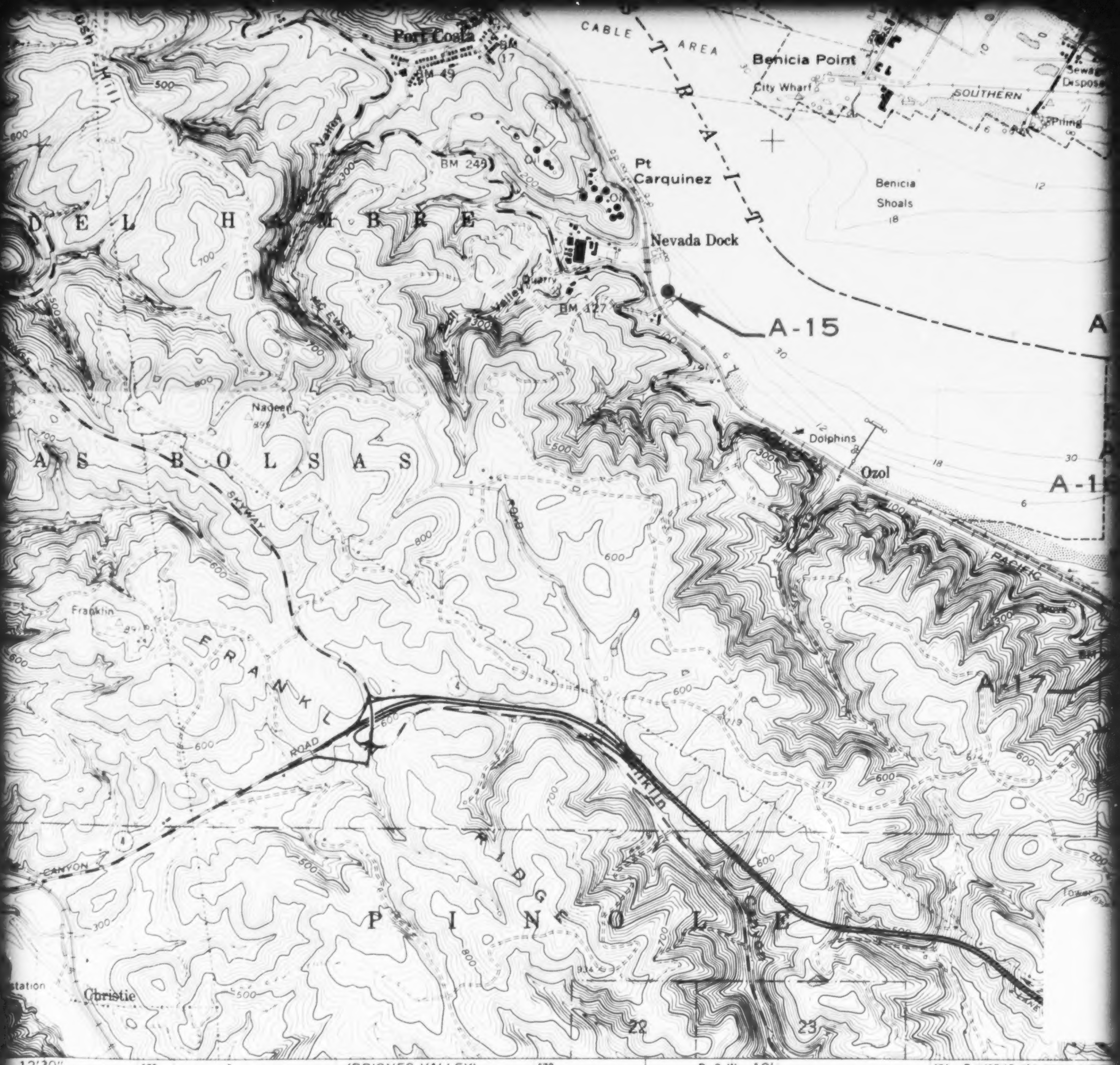
FOR SALE BY U.S. GEOLOGICAL S
A FOLDER DESCRIBING TO


Port Costa
CABLE AREA
S T R A I T
Benicia Point
City Wharf
SOUTHERN
Sewag
Dispose
Piling
BM 45
BM 249
Pt Carquinez
Benicia Shoals
Nevada Dock
DEL HAMBRE
MC EWEN
BM 127
A-15
Nadeen
895
Dolphins
Ozol
A-16
LAS BOLSAS
SKYWAY
PACIFIC
Franklin
FRANKLIN
ROAD
A-17
RIDGE
PINOLE
CANYON
Christie
station
22
23
500
600
700
800
300
30
18
12
6

12'30" 570 (BRIONES VALLEY) 1559 I NW 572 R. 3 W. 10' 574 ● INTERIOR—GEOLOGICAL SURVEY

5 MI. TO INTERSTATE 68
PITTSBURG 16 M

SCALE 1:24 000

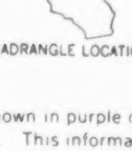
1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4 FEET



QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple compiled from aeria
taken 1968. This information not field check

Purple tint indicates extension of urban areas

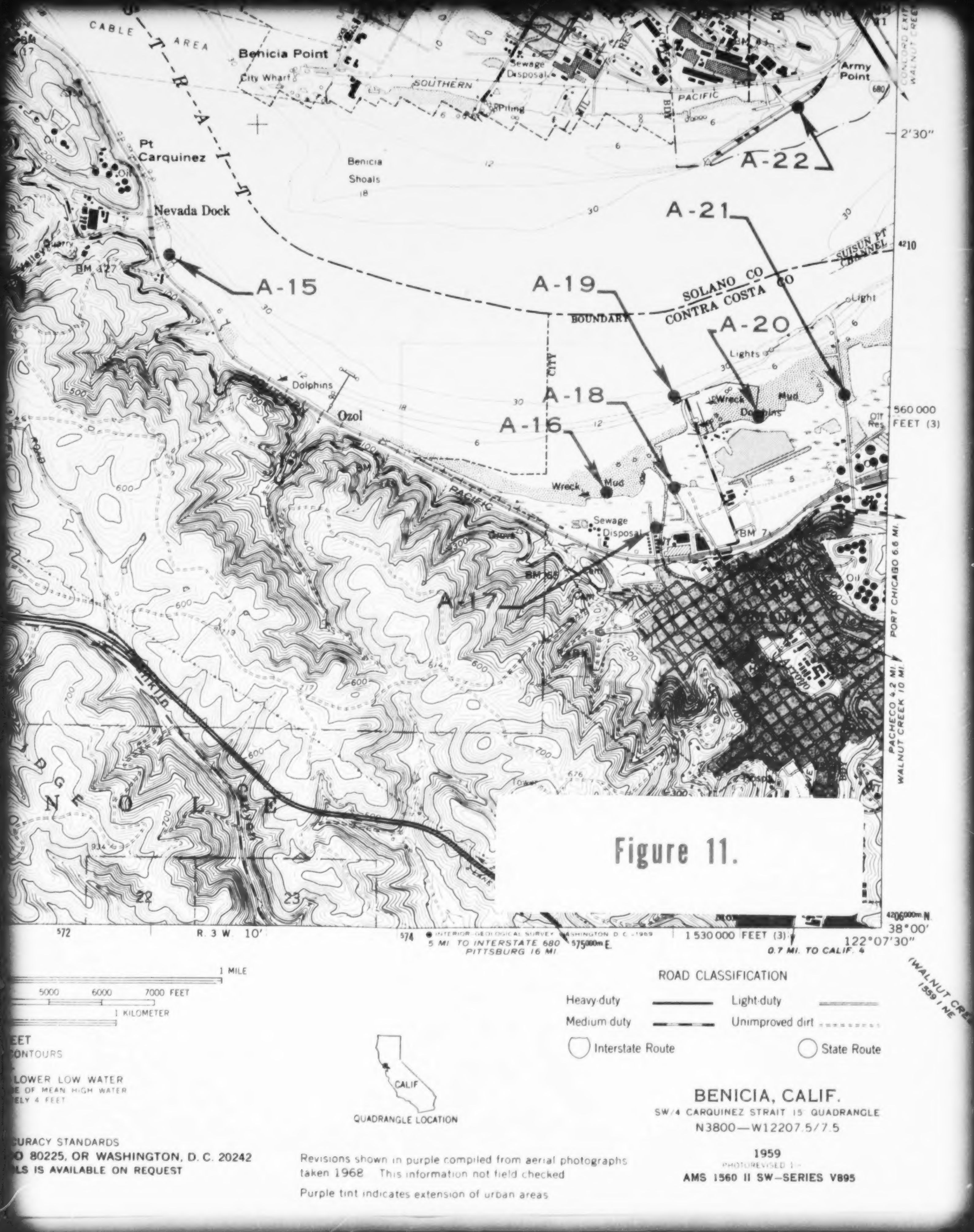

Benicia Point
City Wharf
Sewage Disposal
Army Point
Pt Carquinez
Nevada Dock
Benicia Shoals
A-15
A-16
A-17
A-18
A-19
A-20
A-21
A-22
SOLANO CO
CONTRA COSTA CO
BOUNDARY
SUISUN PT CHANNEL
Ozol
Dolphins
Wreck
Mud
Lights
BM 7
PORT CHICAGO 6.6 MI.
PACHECO 4.2 MI.
WALNUT CREEK 10 MI.
2'30"
4210
560 000 FEET (3)
4206000m N.
38°00'
122°07'30"
572
574
575000m E.
R. 3 W. 10'
1 530 000 FEET (3)
5 MI. TO INTERSTATE 680
PITTSBURG 16 MI.
0.7 MI. TO CALIF. 4
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1969
1 MILE
5000
6000
7000 FEET
1 KILOMETER
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
Interstate Route
State Route
CALIF
QUADRANGLE LOCATION
BENICIA, CALIF.
SW/4 CARQUINEZ STRAIT 15' QUADRANGLE
N3800—W12207.5/7.5
1959
PHOTOREVISED 1
AMS 1560 II SW—SERIES V895
(WALNUT CREEK 1559 I NE)
CURACY STANDARDS
O 80225, OR WASHINGTON, D. C. 20242
LS IS AVAILABLE ON REQUEST
Revisions shown in purple compiled from aerial photographs taken 1968. This information not field checked
Purple tint indicates extension of urban areas

Figure 11.

A-13 April - At this particular location within the C & H Sugar Company, two subsurface discharges were active.

July - Water level characteristics at the time of flight indicated the presence of the above mentioned active outfalls and possibly a third in the immediate area.

"July Night" - The two outfalls were discharging a hot effluent at the time of flight. They are shown in Figure 9. The effluents were creating a thermal plume 92 meters (300 feet) in a length parallel to shore.

A-14 "July Night" - Evidence of a warm discharge was recorded at this location. Inspection of the daytime optical imagery provided nothing to confirm the presence of an outfall. There were several buildings south of this area across the railway tracks.

A-15 April - An orange-brown substance was being discharged through a small open ditch into the Strait.

July - No discharge present.

A-16 April - There was a moderate discharge from a small shoreline indentation into Carquinez Strait with no subsequent discoloration in the receiving waters. An STP was located in this immediate vicinity.

July - Identical indication recorded.

"July Night" - The discharge was warm at this time of flight as shown in Figure 12.

A-17 April - A possible discharge was located in this area. No significant discoloration was seen in this area.

July - Same indication as April.

"July Night" - This waterway was quite warm as seen in Figure 12.

A-18 April - An inactive outfall was observed at this location.

July - Identical indication.

A-19 "July Night" - A small thermal field or plume was detected in this area (Figure 12) suggesting a possible discharge. It extended approximately 12 meters out from shore.

A-20 "July Night" - A small warm outflow was recorded in this area, as shown in Figure 12. The source(s) could not be ascertained. The resultant thermal plume extended nearly 15 meters (50 feet) out from shore.

A-21 April - An active outfall was creating a dark gray plume. The discoloration could be traced back to an aeration pond.

July - The outfall was also active. A black substance was floating on the water in the area of this outfall.

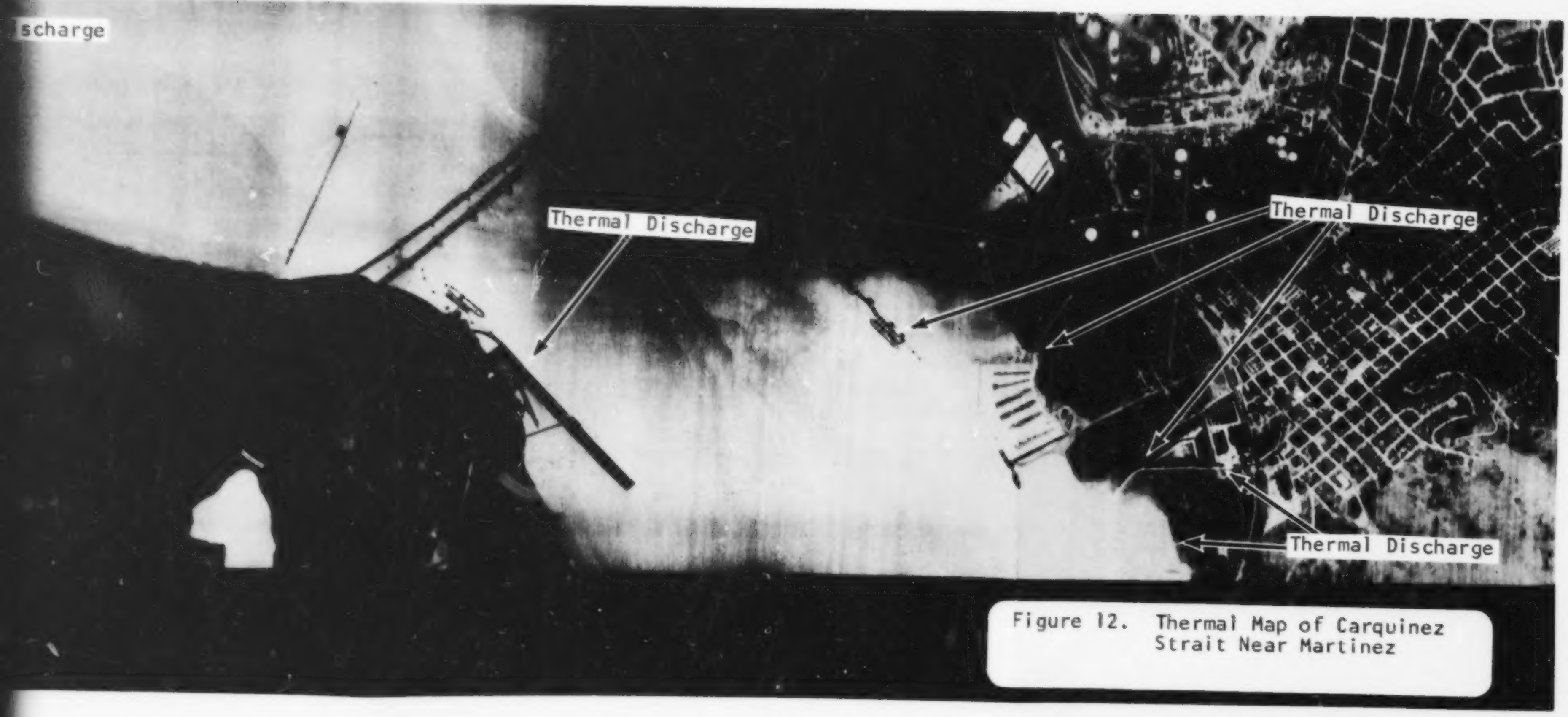
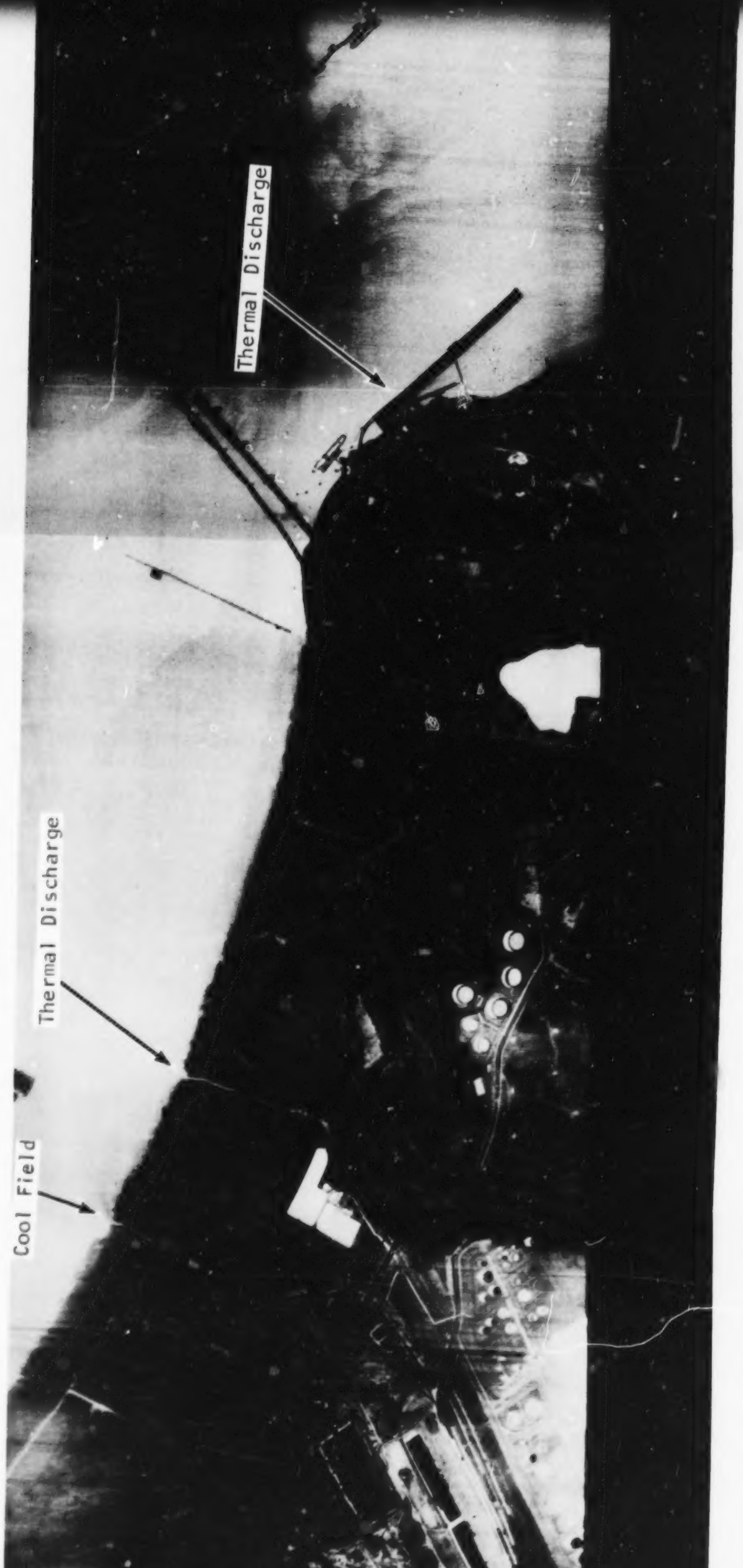

scharge
Thermal Discharge
Thermal Discharge
Thermal Discharge

Figure 12. Thermal Map of Carquinez Strait Near Martinez


Thermal Discharge
Thermal Discharge
Cool Field

A-22 "July Night" - A small warm thermal plume originating at this point, had moved west along the shore for 15 meters (50 feet) where it had cooled to the ambient temperature of the Strait waters.

NOTE: Indication numbers A-23 through A-35 appear on Figure 13 the Port Chicago map.

A-23 April - This waterway was yellow-brown in color at the time of flight. There was no visible plume or extended dispersion pattern in Carquinez Strait.

July - Same indication as April.

A-24 April - A green-brown substance was entering the Strait from this ditch. There was no appreciable plume in the receiving water.

July - Identical indication.

A-25 April - The discharge from this waterway into Suisun Bay was a gray-brown color. A moderate sized plume was generated in the Bay and flowed in a southwesterly direction for 200 meters (650 feet) before it dispersed sufficiently to lose its identity.

"July Night" - This discharge was warm as indicated in Figure 12.

A-26 April - A gray-brown discharge from this ditch entered Suisun Bay creating a small plume that moved in a southwest direction dissipating within 75 meters (245 feet).

UNITED STATES
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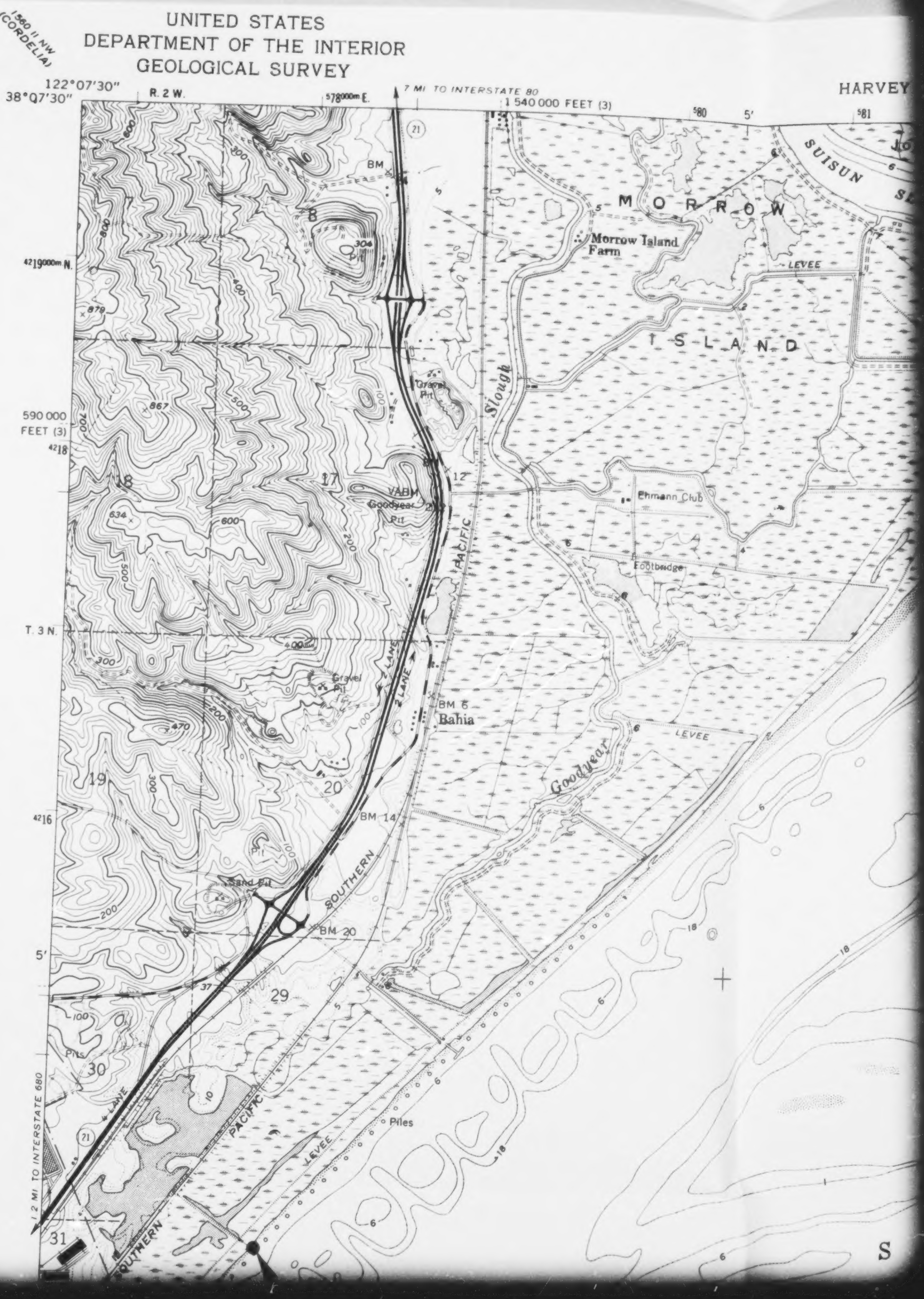
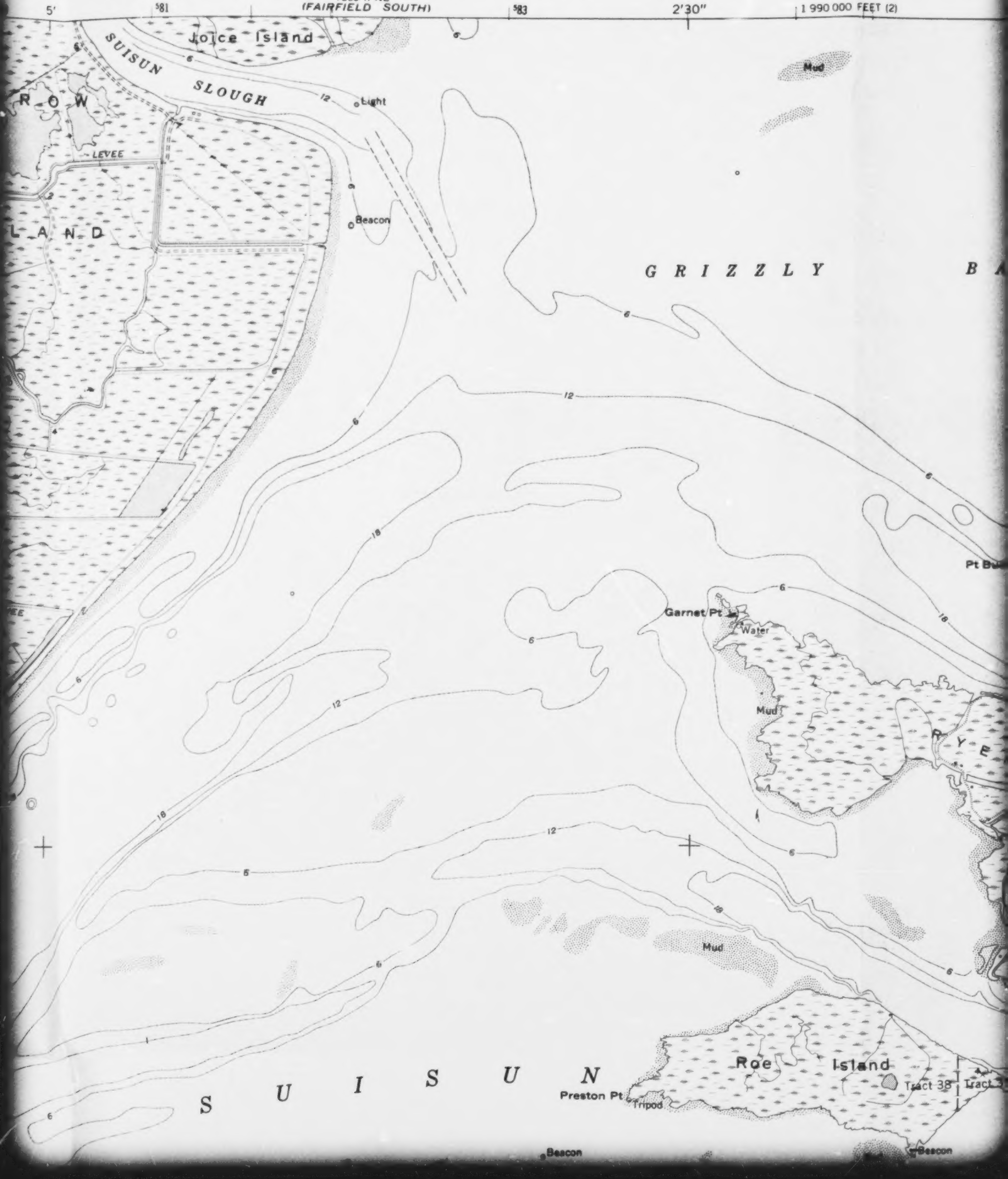
GEOLOGICAL SURVEY


1560 II NW (CORDELIA)
122°07'30"
38°07'30"
R. 2 W.
578000m E.
7 MI. TO INTERSTATE 80
1 540 000 FEET (3)
580
5'
581
HARVEY
SUISUN
MORROW
ISLAND
Morrow Island Farm
LEVEE
4219000m N.
879
590 000 FEET (3)
4218
867
634
T. 3 N.
470
4216
5'
Gravel Pit
Goodyear Pit
VABM
BM
BM 6
Bahia
BM 14
BM 20
Sand Pit
Pits
Pit
Slough
PACIFIC
SOUTHERN
2 LANE
4 LANE
Ehmann Club
Footbridge
Goodyear
LEVEE
Piles
21
37
7
8
12
17
18
19
20
29
30
31
1 2 MI. TO INTERSTATE 680
S

STATE OF CALIFORNIA
EDMUND G. BROWN, GOVERNOR
HARVEY O. BANKS, DIRECTOR OF WATER RESOURCES

40-A

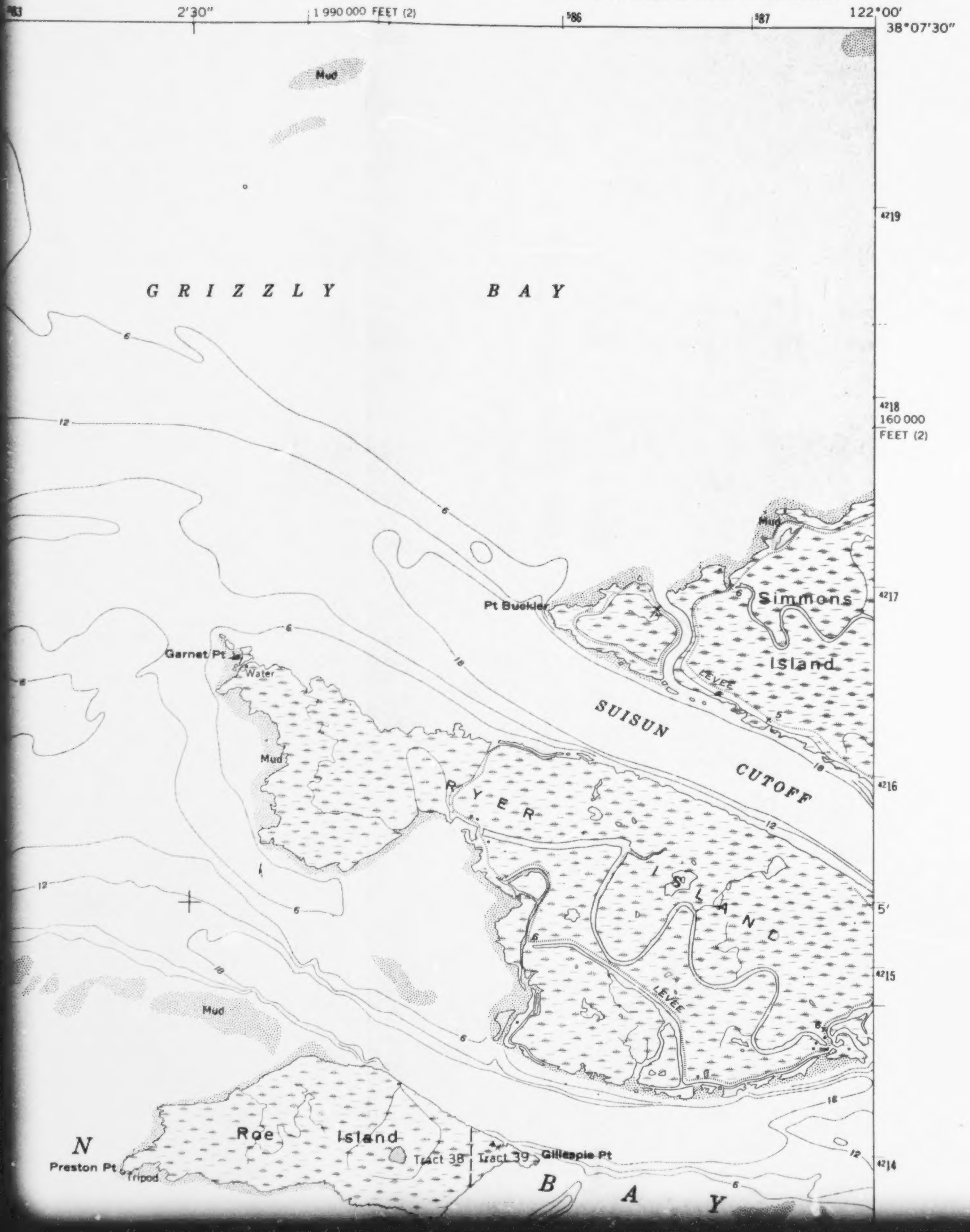

5'
581
1560 II NE
(FAIRFIELD SOUTH)
583
2'30"
1 990 000 FEET (2)
Joice Island
SUISUN SLOUGH
ROW
LAND
LEVEE
Light
Beacon
Mud
GRIZZLY BA
Pt Bu
Garnet Pt
Water
Mud
RYE
Mud
Roe Island
Tract 38
Tract 3
Preston Pt
Tripod
SUISUN
Beacon
Beacon
6
12
18

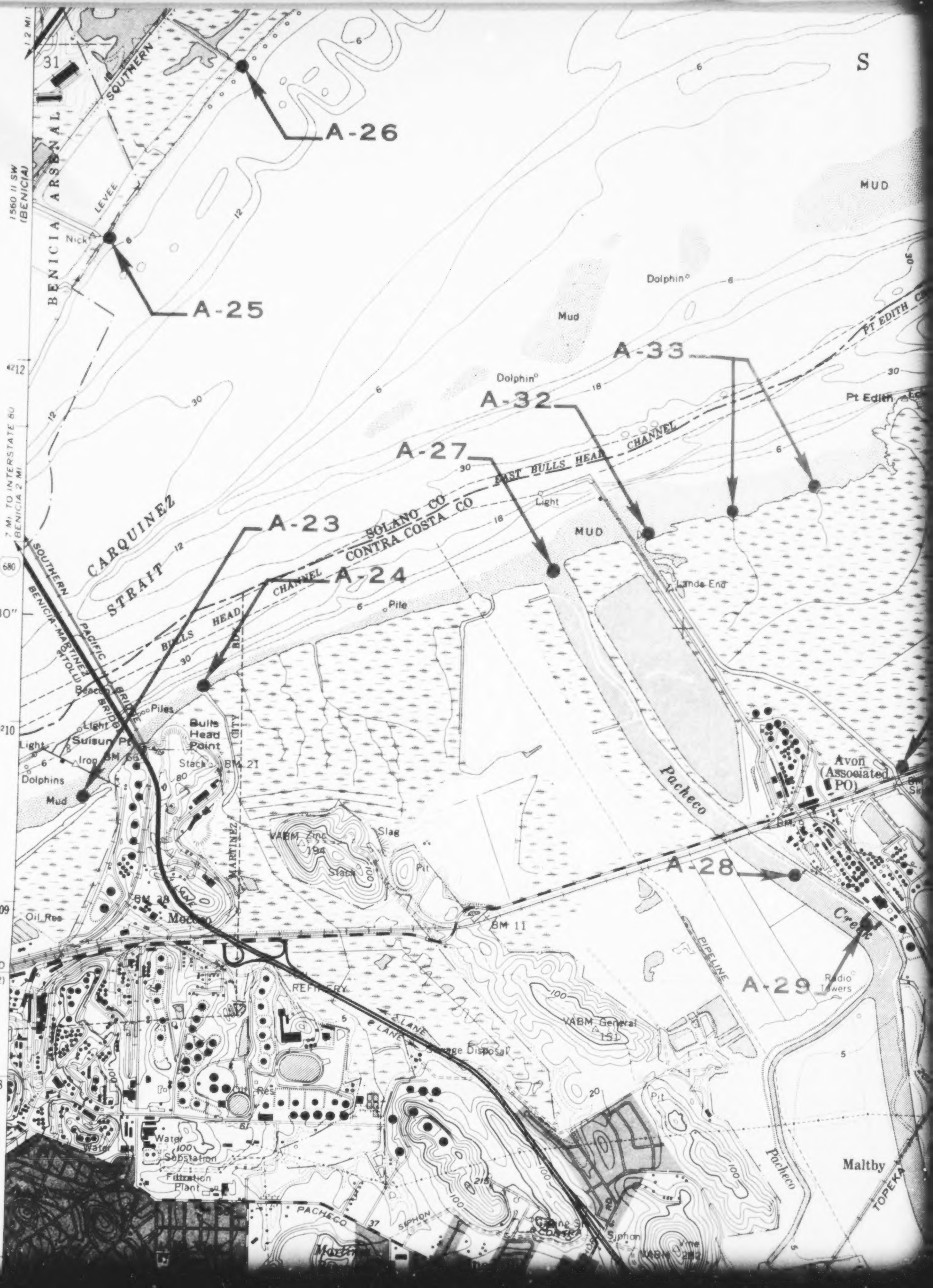
SOURCES

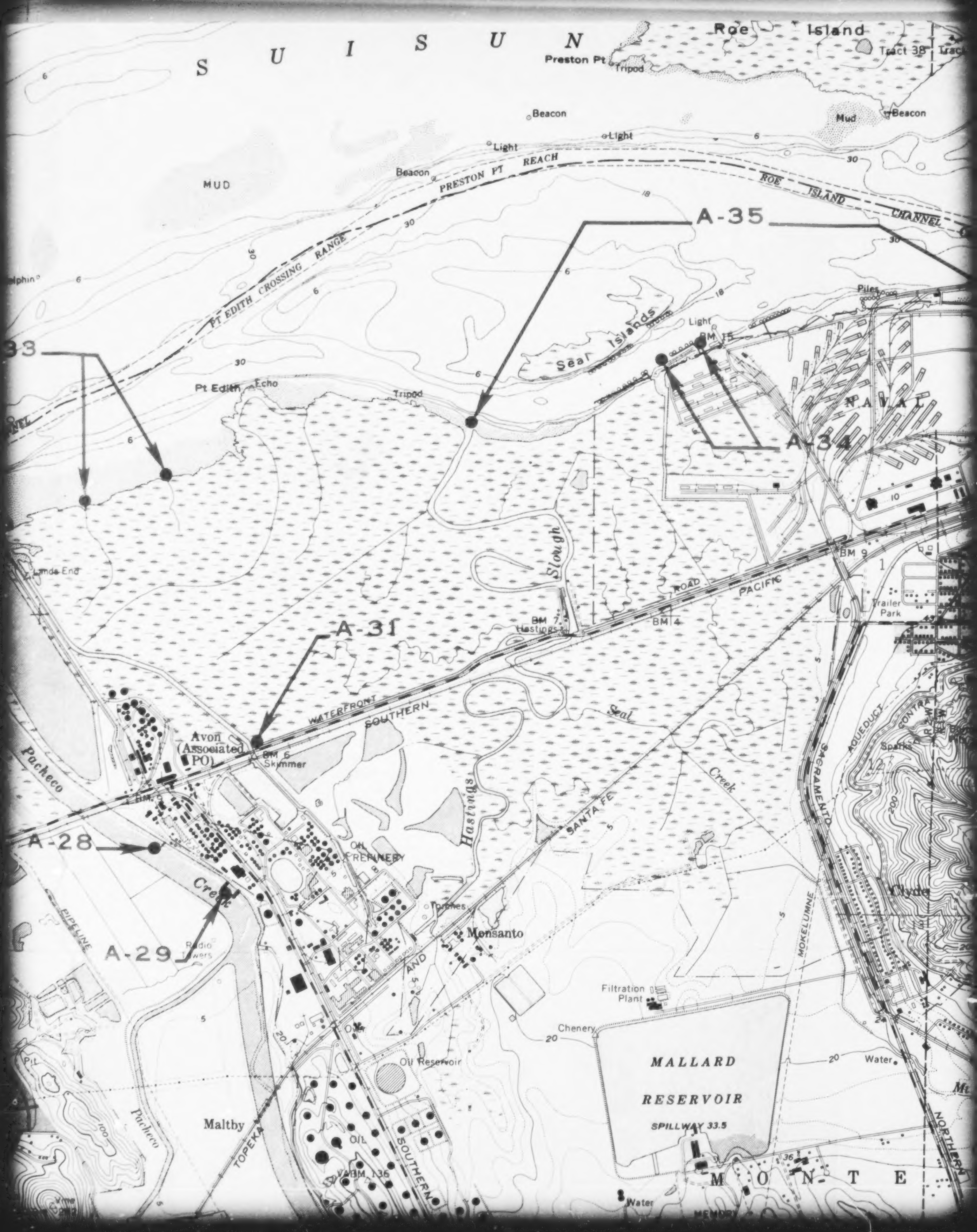
40-A

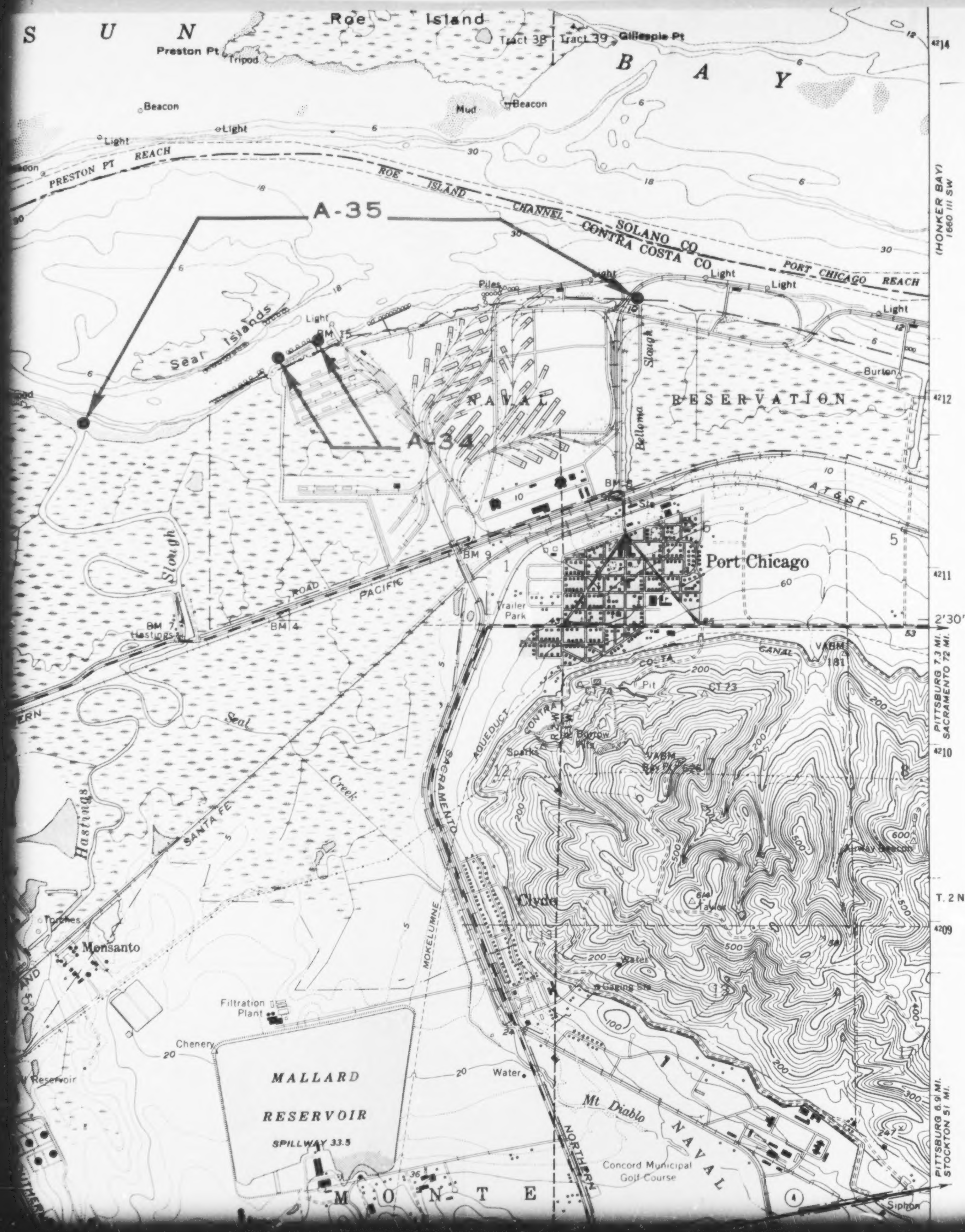
PORT CHICAGO QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 CARQUINEZ STRAIT 15' QUADRANGLE

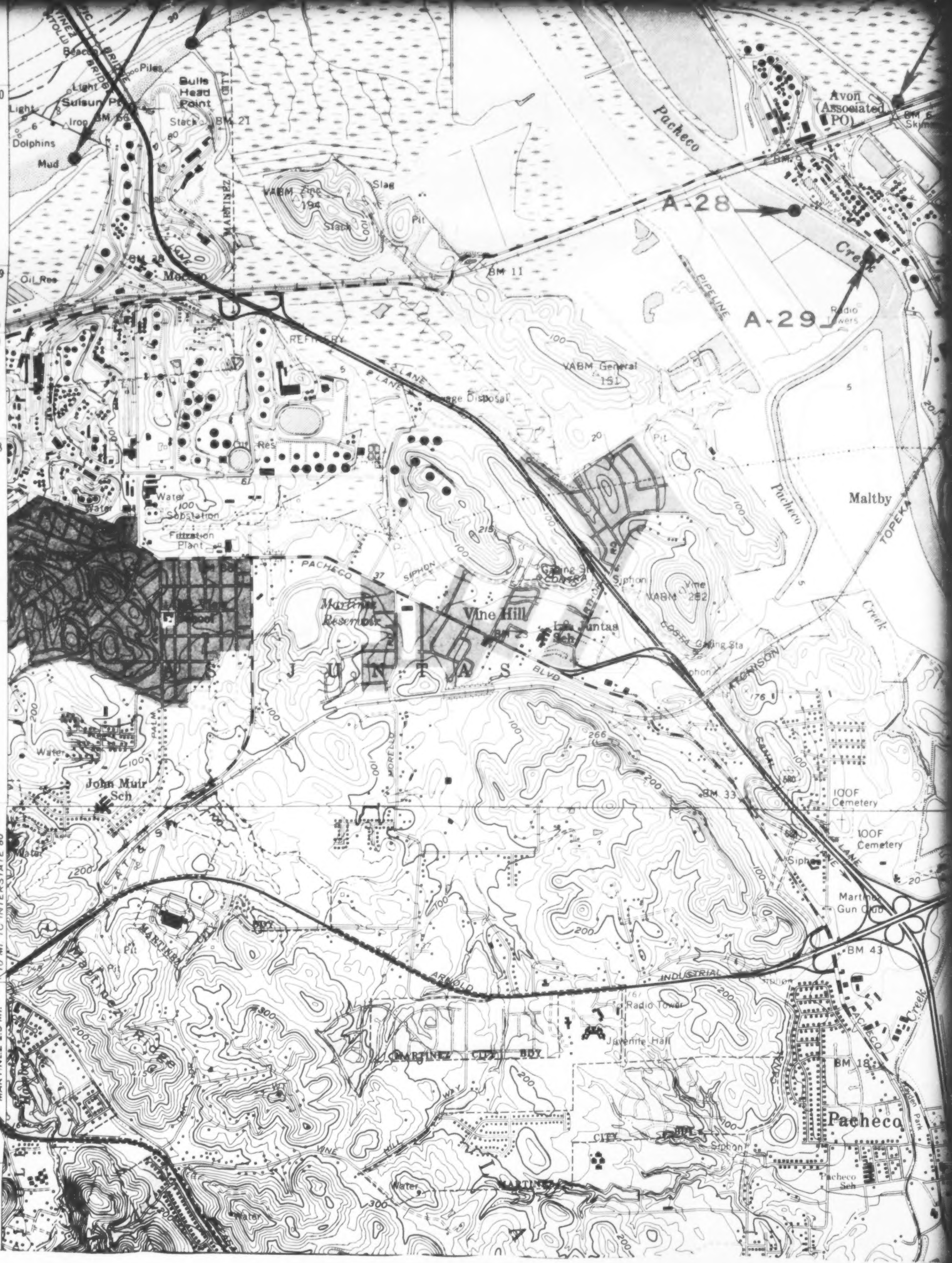
1660 III NW
(DENVERTON)

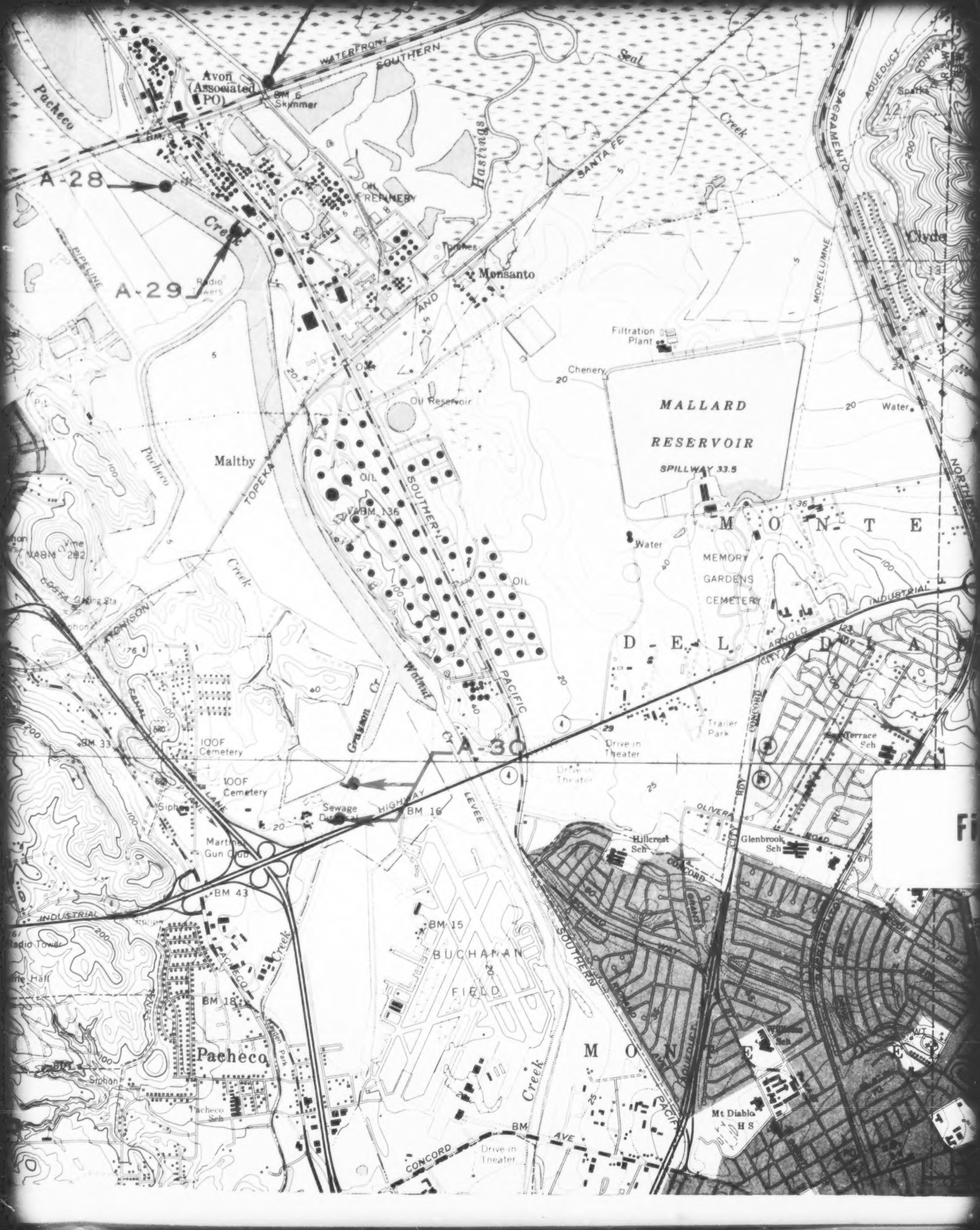

583
2'30"
1 990 000 FEET (2)
586
587
122°00'
38°07'30"
Mud
GRIZZLY BAY
4219
6
12
4218
160 000
FEET (2)
Mud
Pt Buckler
Simmons Island
Garnet Pt
Water
6
18
LEVEE
5
SUISUN CUTOFF
Mud
RYER ISLAND
4216
12
5'
LEVEE
4215
Mud
18
6
Roe Island
Tract 38
Tract 39
Gillespie Pt
Preston Pt
Tripod
N
4214
BAY


S
A-26
A-25
A-33
A-32
A-27
A-23
A-24
A-28
A-29
MUD
Mud
Dolphin
Pt Edith
PT EDITH CHANNEL
EAST BULLS HEAD CHANNEL
BULLS HEAD CHANNEL
CARQUINEZ STRAIT
SOLANO CO
CONTRA COSTA CO
BENICIA ARSENAL
SOUTHERN
LEVEE
Nick
1560 II SW (BENICIA)
7 MI. TO INTERSTATE 80 BENICIA 2 MI
680
SOUTHERN PACIFIC BRIDGE
BENICIA-MARTINEZ TOLL BRIDGE
Light
Beacon
Piles
Pile
Suisun Pt
Bulls Head Point
Dolphins
Stack
BM 21
BM 66
MARTINEZ CITY
VABM Zinc 194
Slag
Pit
Lands End
Pacheco Creek
Avon (Associated PO)
PIPELINE
Radio Towers
BM 11
BM 38
Oil Res
Martinez
REFINERY
LANE
Sewage Disposal
VABM General 151
Water
Substation
Filtration Plant
PACHECO
SIPHON
Maltby
TOPEKA
2'30"
4212
4210
4209
4208
130 000 FEET (2)
31


S U I S U N
Roe Island
Tract 38
Preston Pt
Tripod
Beacon
Mud
Light
MUD
PRESTON PT REACH
ROE ISLAND CHANNEL
PT EDITH CROSSING RANGE
A-35
Seal Islands
Light
BM 15
Piles
33
Pt Edith
Echo
Tripod
NAVAL
A-34
Lands End
Slough
BM 7
Hastings
BM 4
BM 9
ROAD
PACIFIC
Trailer Park
A-31
WATERFRONT
SOUTHERN
Seal
Creek
AQUEDUCT
CONTRA
Sparks
Avon
(Associated PO)
BM 6
Skimmer
Pacheco
Hastings
SANTA FE
SACRAMENTO
A-28
OIL REFINERY
Creek
Tormey
Monsanto
Clyde
PIPELINE
A-29
Radio Towers
AND
MOKELUMNE
Filtration Plant
Chenery
Oil Reservoir
Water
MALLARD
RESERVOIR
SPILLWAY 33.5
Maltby
Pacheco
TOPEKA
OIL
VABM 136
SOUTHERN
M O N T E
NORTHERN
Water


SUN
Roe Island
Tract 38
Tract 39
Gillespie Pt
Preston Pt
Tripod
BAY
Beacon
Light
Mud
PRESTON PT REACH
ROE ISLAND CHANNEL
SOLANO CO
CONTRA COSTA CO
PORT CHICAGO REACH
A-35
A-34
Seal Islands
Piles
BM 15
Light
NAVAL RESERVATION
Bellona Slough
Burton
BM 8
Sta
AT&SF
Port Chicago
BM 9
PACIFIC
ROAD
Trailer Park
BM 7
Hastings
BM 4
Slough
Seal Creek
Hastings
SANTA FE
CONTRA COSTA CANAL
VABM 181
Pit
CT 73
AQUEDUCT
Borrow Pits
Sparks
VABM Bay Pt
SACRAMENTO
MOKELUMNE
Airway Beacon
Clyde
Taylor
T. 2 N.
Water
Gaging Sta
Torches
Monsanto
Filtration Plant
Chenery
Reservoir
MALLARD RESERVOIR
SPILLWAY 33.5
Water
Mt Diablo
NAVAL
NORTHERN
Concord Municipal Golf Course
MONTE
Siphon
(HONKER BAY) 1660 III SW
PITTSBURG 7.3 MI. SACRAMENTO 72 MI.
PITTSBURG 6.9 MI. STOCKTON 51 MI.
2'30"
4214
4212
4211
4210
4209


Bulls Head Point
Suisun Pt
Beacon
Piles
Light
Iron
BM 66
Dolphins
Mud
Stack
BM 21
MARTINEZ
VABM Zinc 194
Slag
Pit
BM 11
Oil Res
Martinez
4210
4209
4208
130 000 FEET (2)
Pacheco
Avon (Associated PO)
BM 6
BM 9
A-28
Creek
A-29
Radio Towers
PIPELINE
REFINERY
2 LANE
Sewage Disposal
VABM General 151
Water
Substation
Filtration Plant
PACHECO
SIPHON
Martinez Reservoir
Vine Hill
Las Juntas Sch
BM 23
Siphon
VABM Vine 282
Gaging Sta
LAS JUNTAS
BLVD
Maltby
TOPEKA
Pacheco
Creek
ECHISON
176
266
MORELLO
PALM
John Muir Sch
Water
38° 00'
BM 33
IOOF Cemetery
IOOF Cemetery
LANE
Martinez Gun Club
BM 43
INDUSTRIAL
ARNOLD
MARTINEZ
BDY
Radio Tower
Juvenile Hall
MARTINEZ CITY BDY
Alhambra
Ridge
VINE HILL WAY
CITY BDY
MARTINEZ
Siphon
Water
10 MI. TO INTERSTATE 80
MARTINEZ 2.5 MI.
4204000m.N.
Pacheco
BM 18
PACHECO
Creek
Park
Pacheco Sch
100
200
300


Avon (Associated PO)
BM 6 Skinner
WATERFRONT
SOUTHERN
Pacheco
Seal
Creek
Hastings
SANTA FE
A-28
Creek
OIL REFINERY
A-29
Radio Towers
Tosches
Monsanto
AND
SACRAMENTO
AQUEDUCT
CONTRA
Sparks
Clyde
MOKELUMNE
Filtration Plant
Chenery
MALLARD RESERVOIR
SPILLWAY 33.5
Oil Reservoir
Water
Pipeline
Pacheco
Maltby
TOPEKA
OIL
SOUTHERN
VABM 136
VABM 282
COSTA
ATCHISON
MONTE
Water
MEMORY GARDENS CEMETERY
OIL
INDUSTRIAL
DEL
ARNOLD
Walnut
Grayson Cr
PACIFIC
Trailer Park
CONCORD
Drive in Theater
Terrace Sch
BM 33
IOOF Cemetery
A-30
Drive in Theater
IOOF Cemetery
Sewage Disposal
HIGHWAY
BM 16
LEVEE
OLIVERA
Siphon
LANE
Martinez Gun Club
Hillcrest Sch
Glenbrook Sch
CONCORD
BM 43
INDUSTRIAL
Radio Tower
BM 15
BUCHANAN FIELD
SOUTHERN
BM 18
Pacheco
Siphon
Pacheco Sch
MONTE
Creek
AQUEDUCT
PACIFIC
Mt Diablo HS
BM
AVE
CONCORD
Drive in Theater
Fi

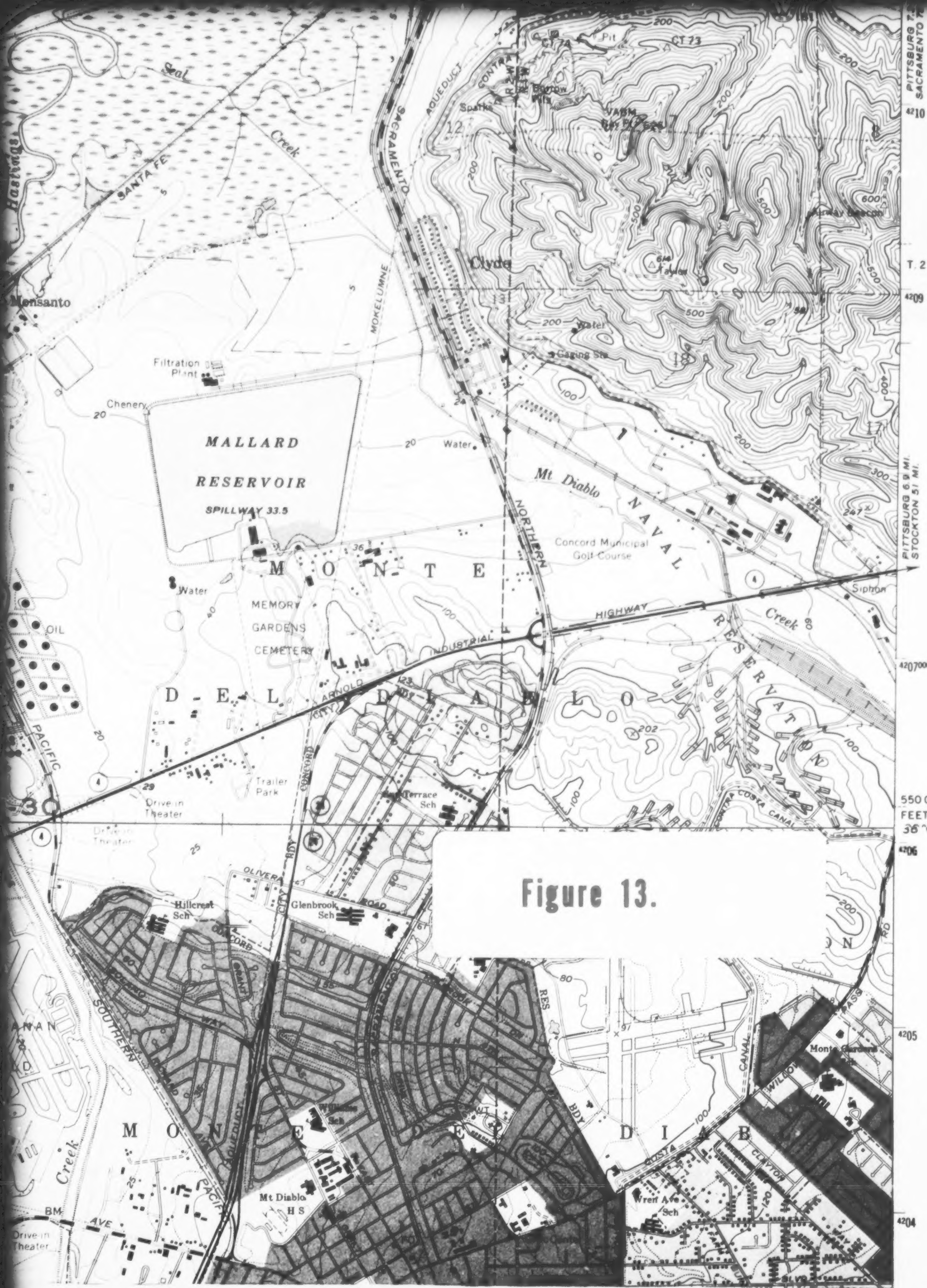

Seal Creek
Hastings
SANTA FE
Monsanto
SACRAMENTO
NORTHERN
AQUEDUCT
CONTRA
MOKELUMNE
Clyde
Filtration Plant
Chenery
MALLARD
RESERVOIR
SPILLWAY 33.5
Water
Gaging Sta
Airway Beacon
Taylor
T. 2 N.
PITTSBURG 6.9 MI.
STOCKTON 51 MI.
PITTSBURG T.
SACRAMENTO
Mt Diablo
NAVAL
RESERVATION
Concord Municipal Golf Course
Siphon
Creek
MONTE
DEL DIABLO
MEMORY GARDENS CEMETERY
OIL
INDUSTRIAL
HIGHWAY
ARNOLD
CITY
CONCORD
BDY
Trailer Park
Drive-in Theater
PACIFIC
SOUTHERN
Bay Terrace Sch
OLIVERA
ROAD
Hillcrest Sch
Glenbrook Sch
CONTRA COSTA CANAL
550 000 FEET (3)
38°00'
4210
4209
4207000m N.
4206
4205
4204
Monte Gardens Sch
Wren Ave Sch
Mt Diablo HS
Willow
CLAYTON
PASS RD
RES
BM
AVE
Creek
MONTE DIAB
CANAL
COSTA

Figure 13.

"July Night" - The discharge from this ditch was imaged as being cooler than the ambient waters of Suisun Bay.

A-27 April - The water in Pacheco Creek was a reddish-brown color and did not create a plume as it entered Suisun Bay.

July - Same indication as April.

A-28 April - An above-surface outfall was recorded at this location. There was no discharge at the time of flight.

July - Identical indication.

A-29 "July Night" - Two outfalls, reportedly from the Phillips Petroleum Company facility, were discharging hot effluents at the time of flight. They are shown in Figure 14. An enlarged view is in Figure 15.

A-30 "July Night" - Two discharges were entering Grayson Creek from the STP as shown in Figure 16. This Figure overlaps the bottom of Figure 14.

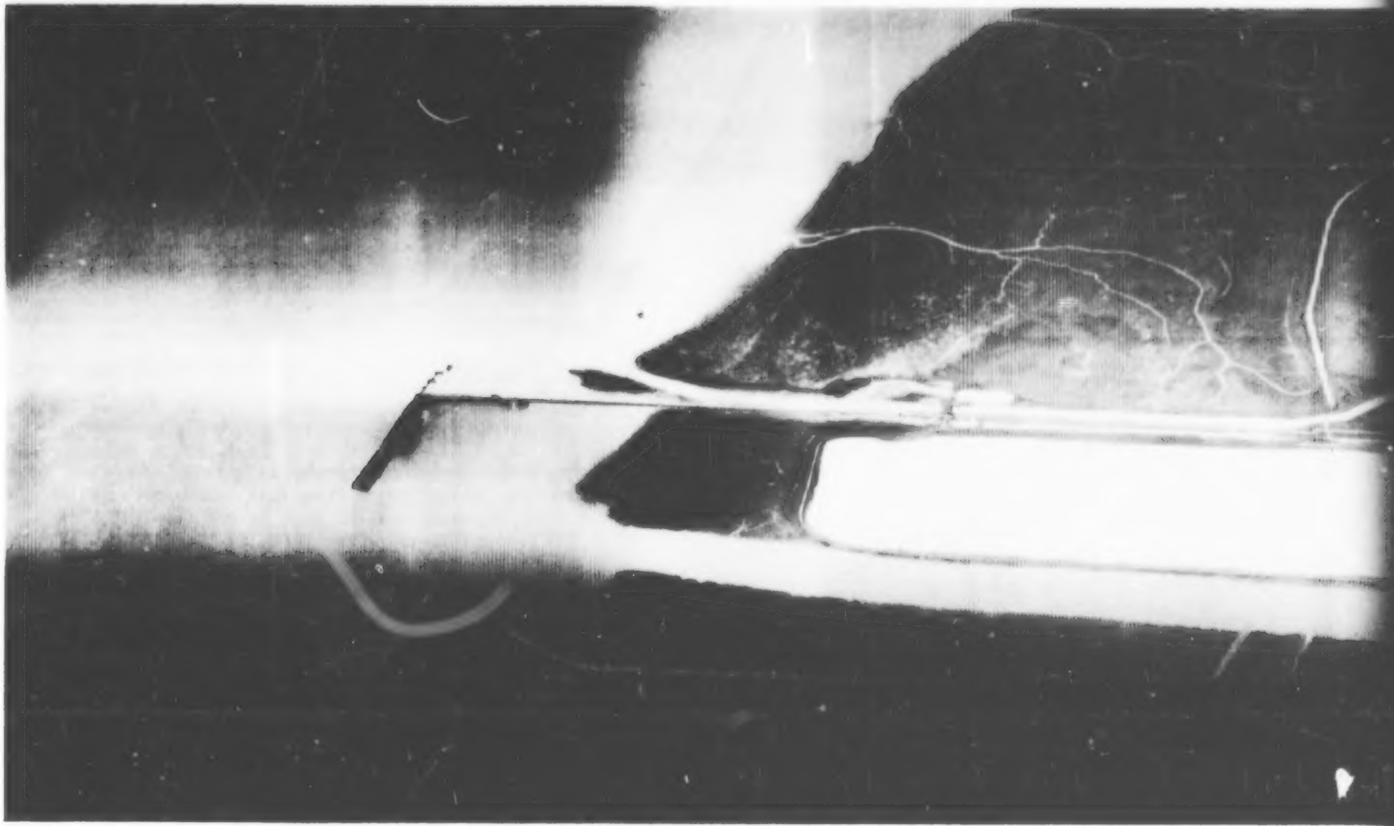
A-31 April - An inactive outfall was recorded at this point.

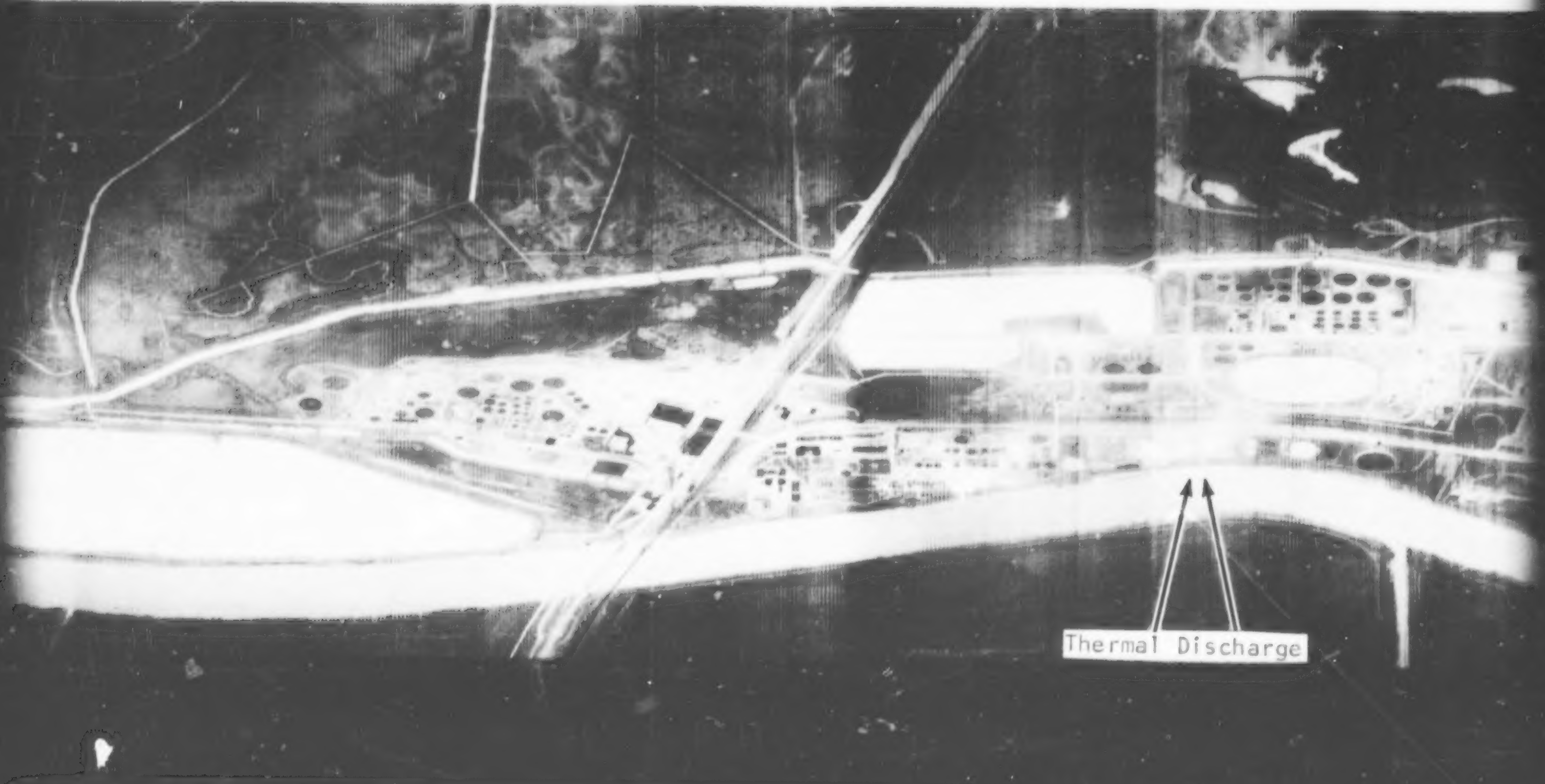
July - Same indication as April.

A-32 April - The color of the water in this area of Suisun Bay was gray-green at the time of flight.

July - No significant discoloration in this area.

"July Night" - The waterway from this point upstream to the ponds were quite warm as shown on Figure 14.




Thermal Discharge

41-A

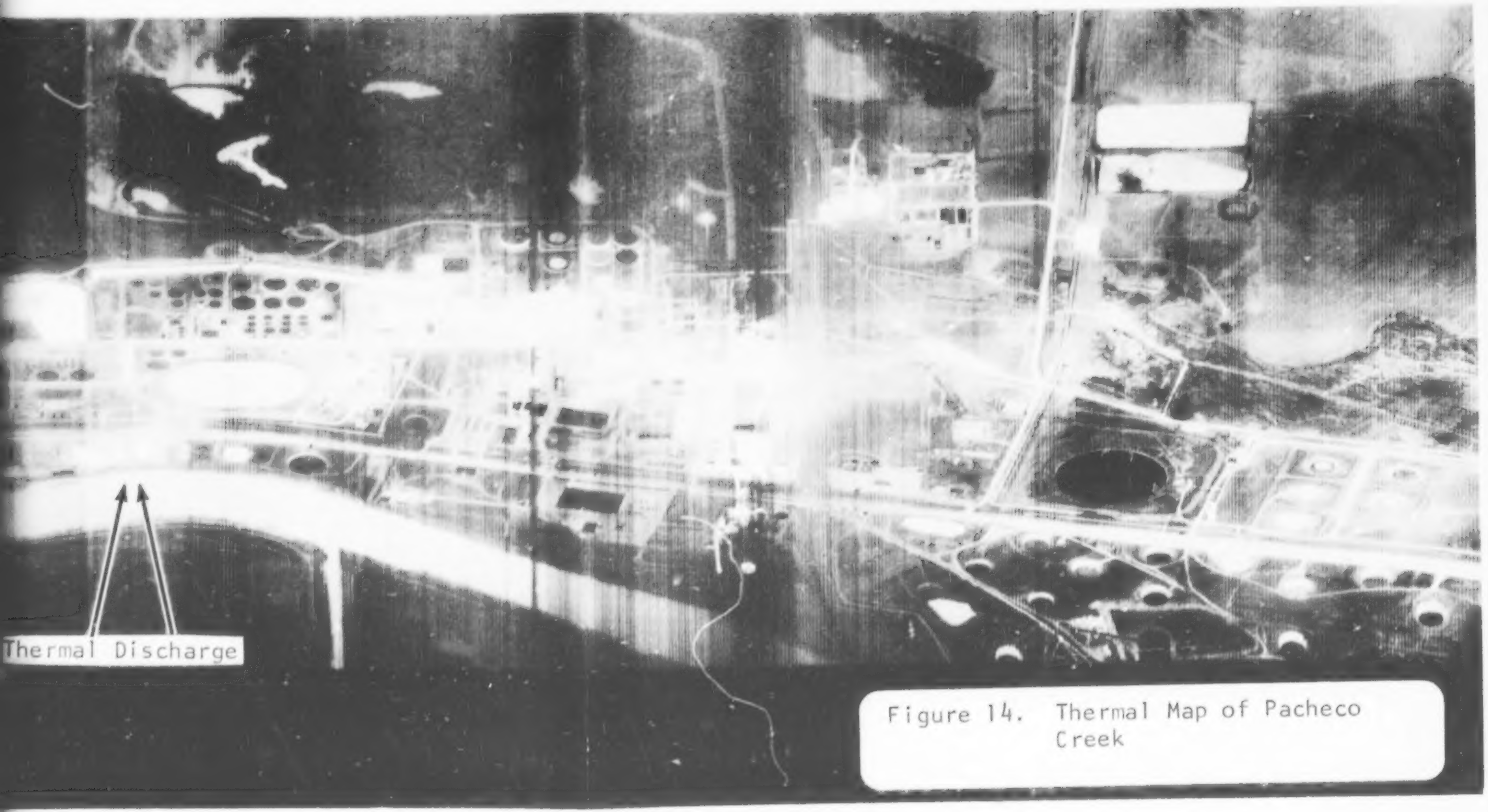

Thermal Discharge

Figure 14. Thermal Map of Pacheco Creek

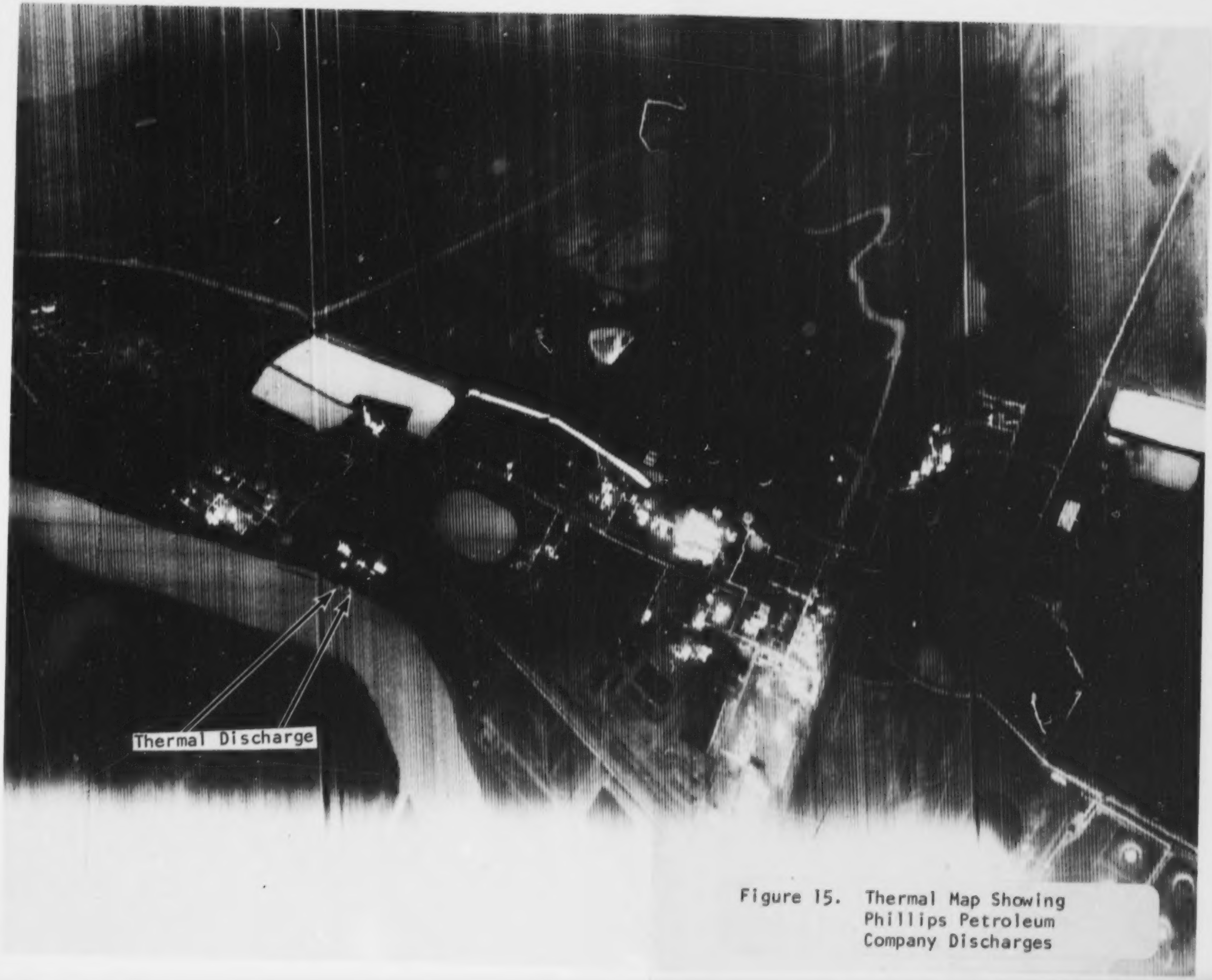
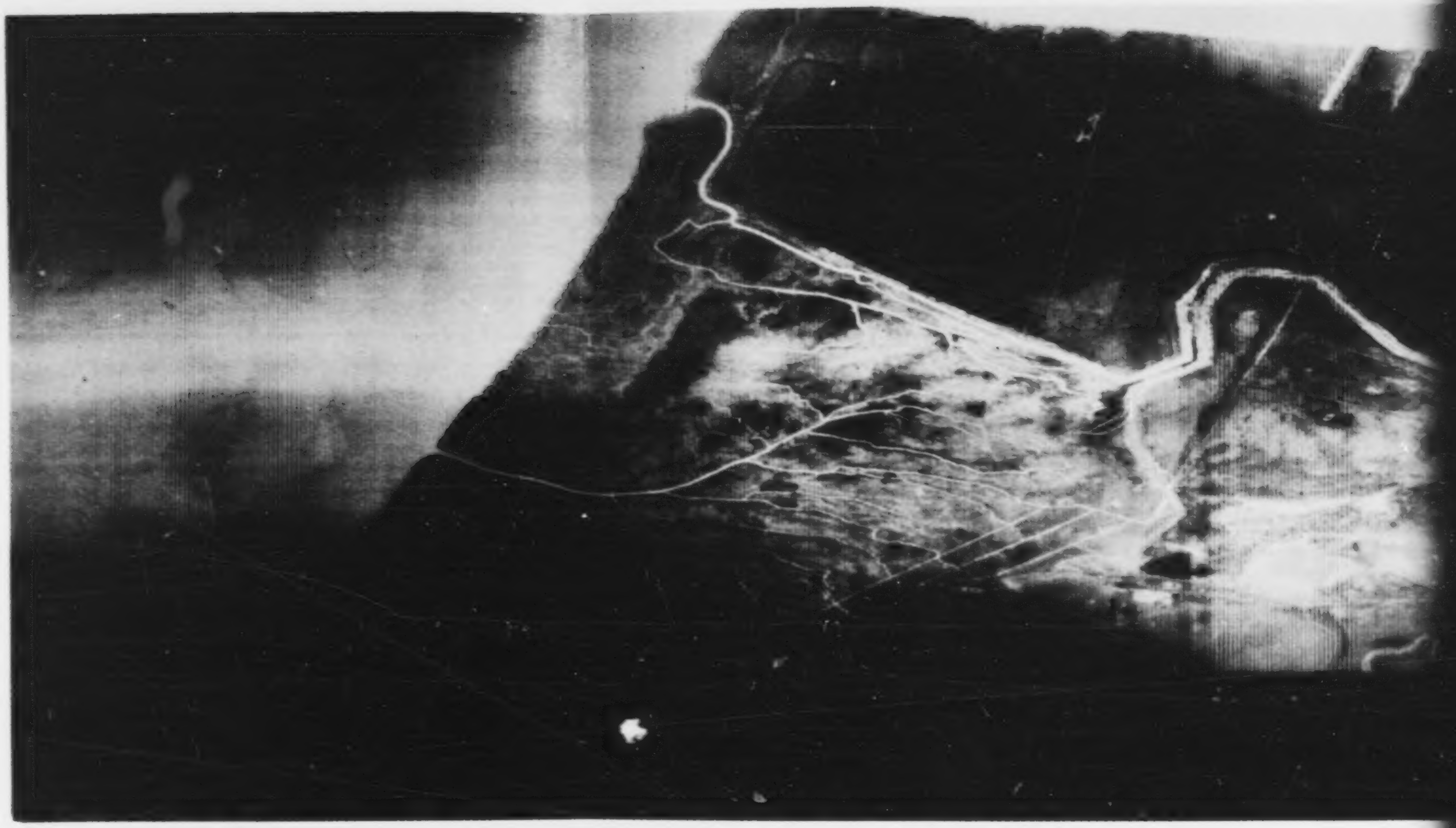
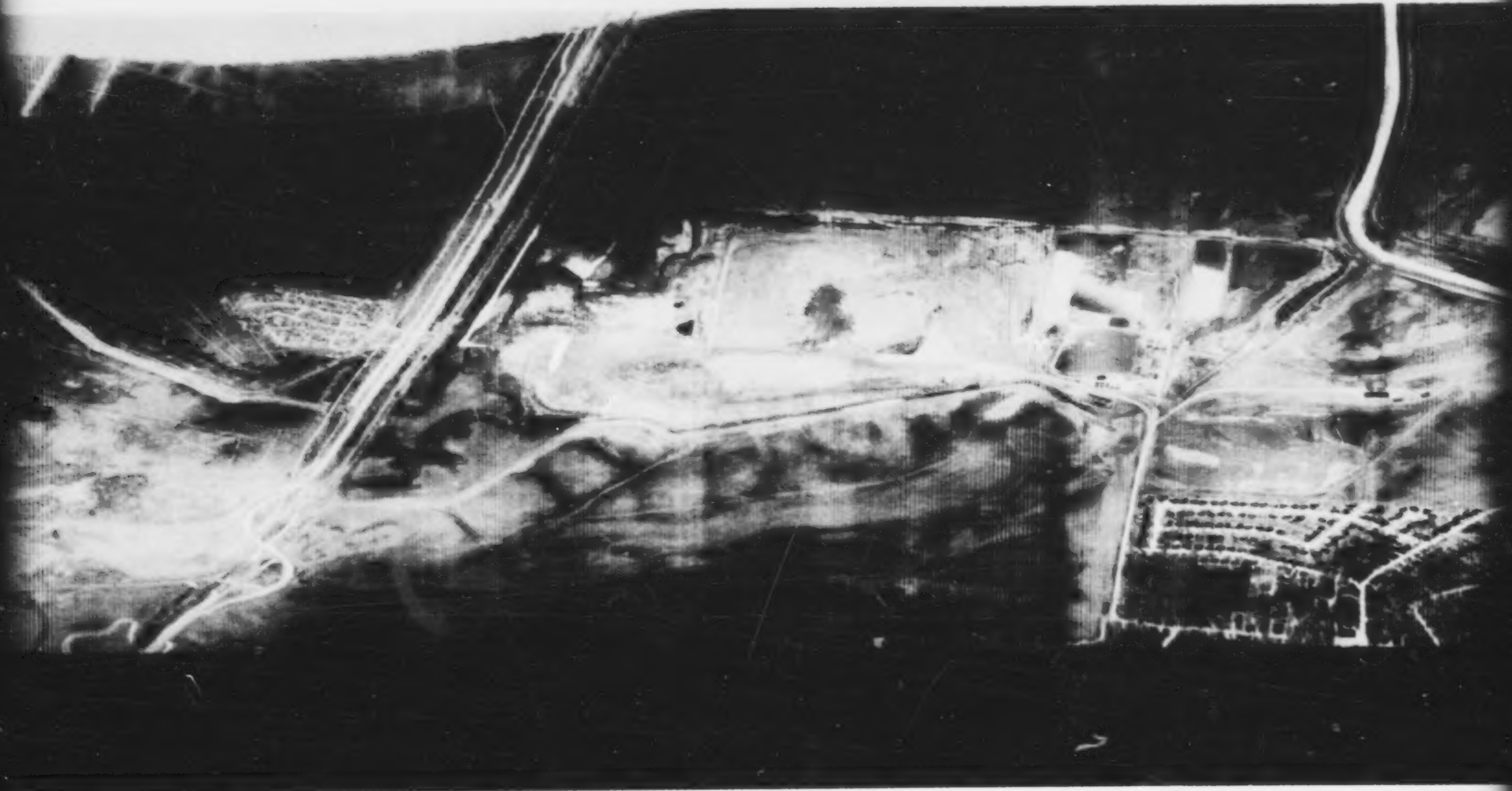
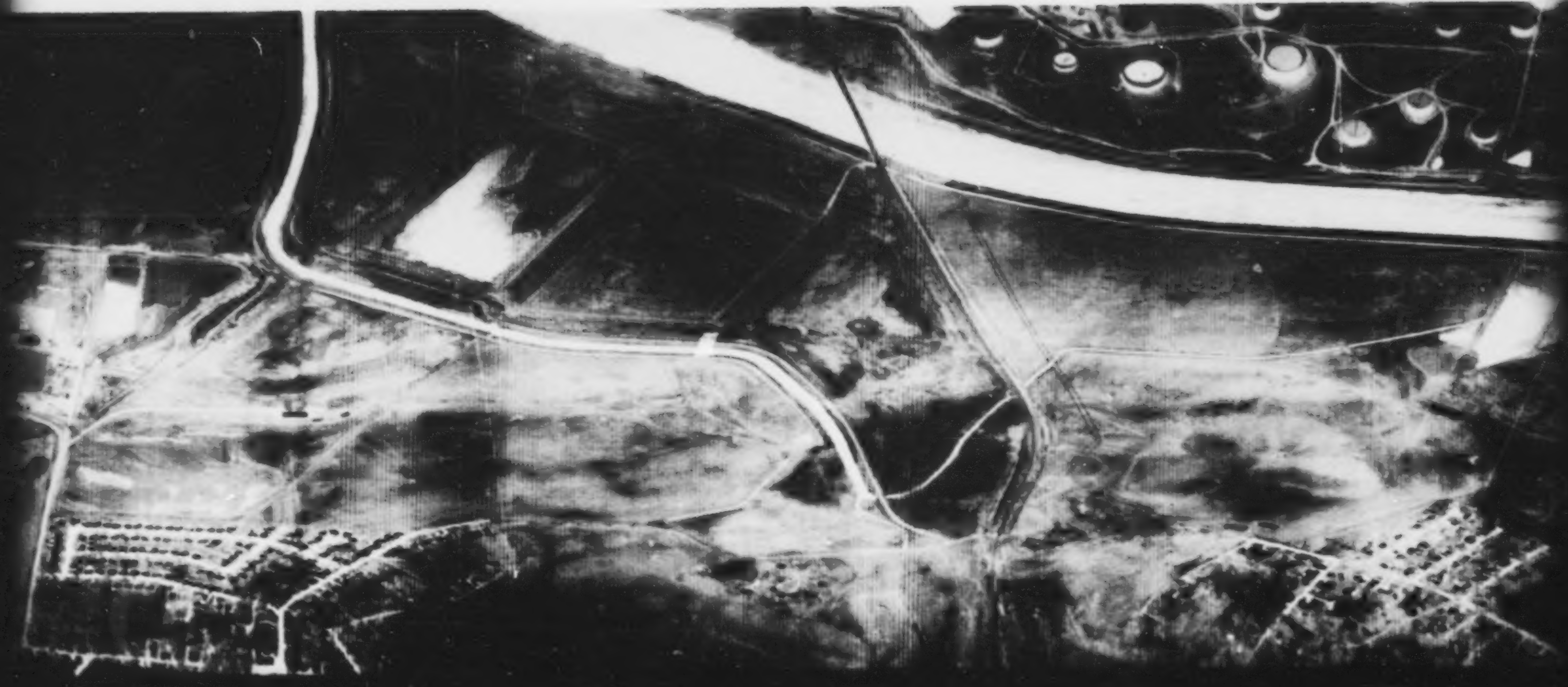

Thermal Discharge

Figure 15. Thermal Map Showing Phillips Petroleum Company Discharges







41-C

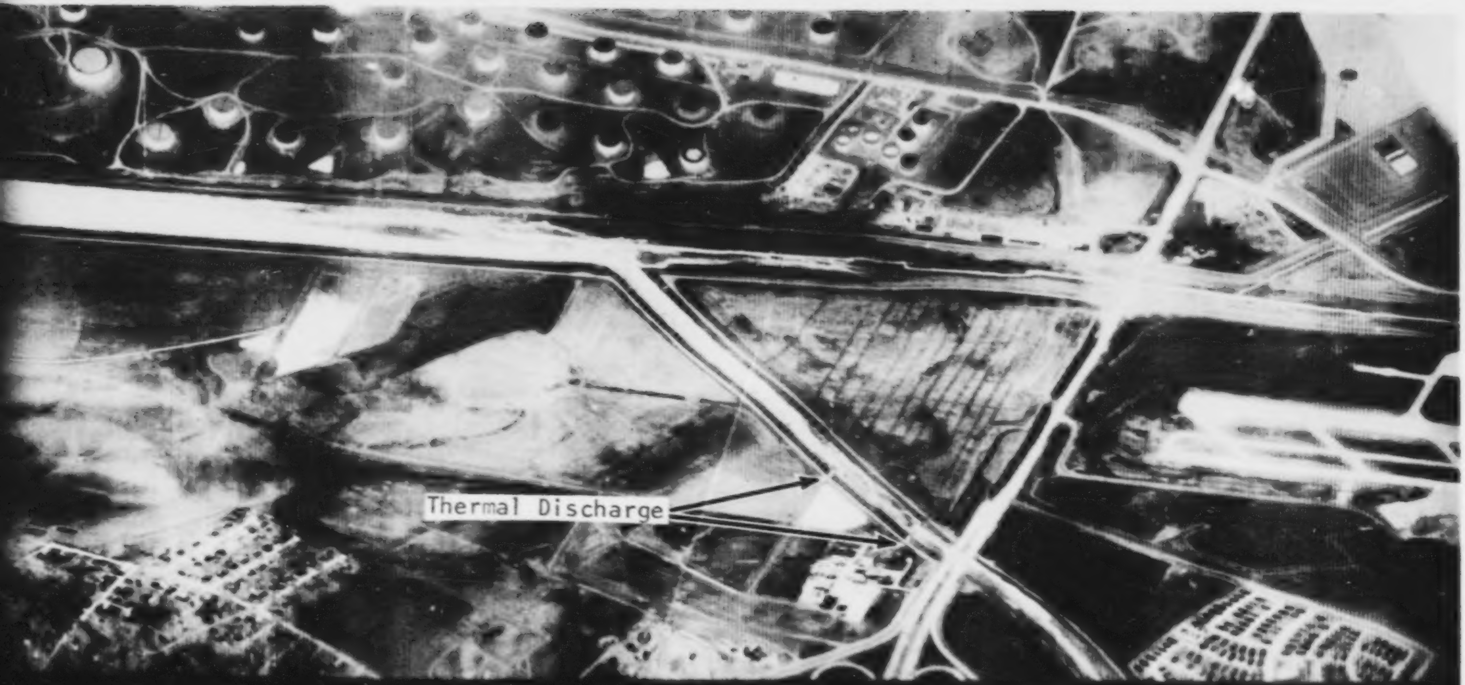

Thermal Discharge

Figure 16. Thermal Map of Pacheco and Grayson Creeks

A-33	April -	Exceptionally turbid water was entering the Bay from these ditches.
A-34	April -	There was a surface outfall at this location. It was not discharging at the time of flight.
	July -	The outfall was not discharging.
A-35	April -	The water in Hastings and Belloma Sloughs was reddish-brown in color. There was no measureable plume in the Bay from these sloughs.

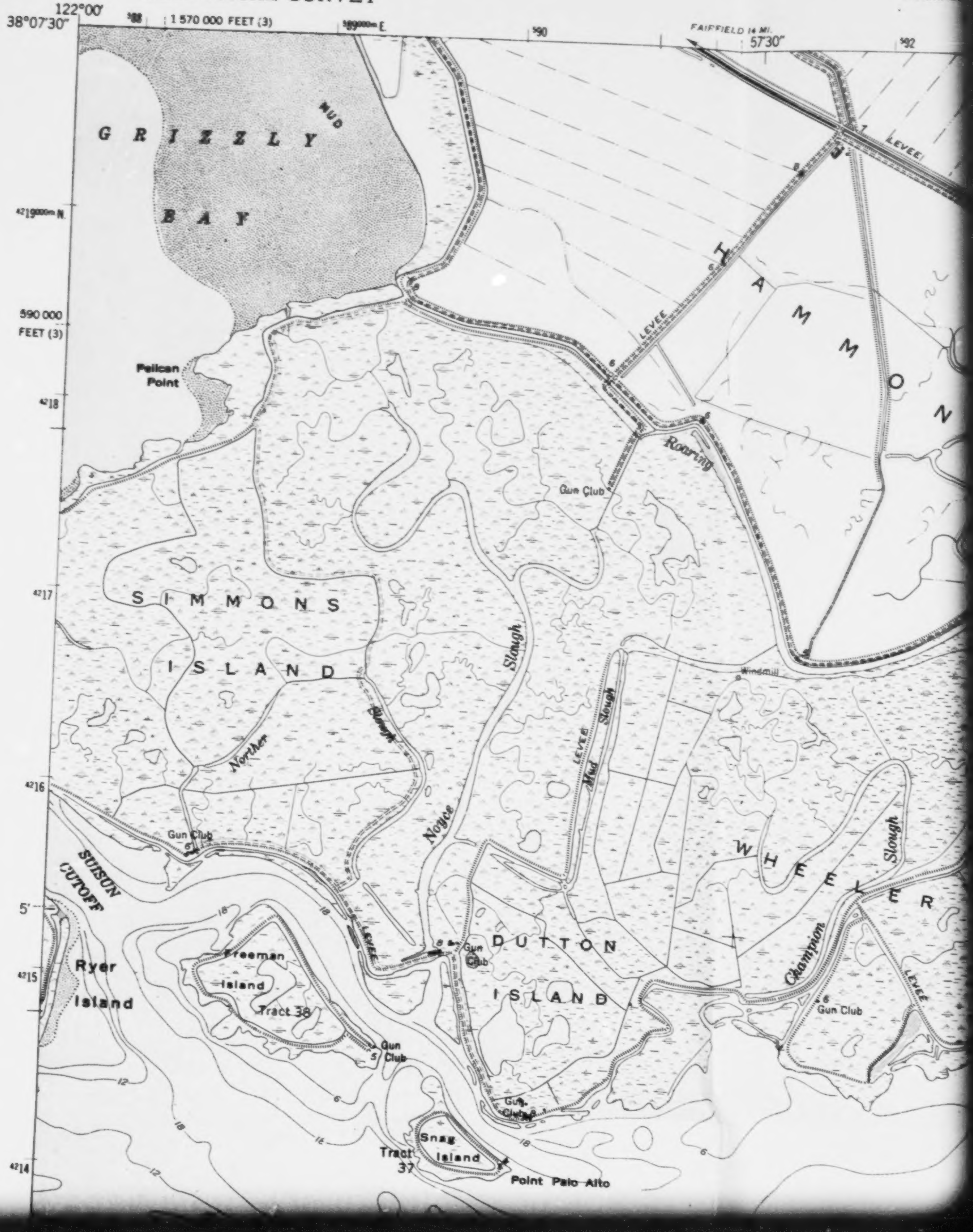
Note: Indication numbers A-36 through A-40 appear on Figure 17, the Honker Bay map.

A-36	April -	There was a dike across the mouth of this geometric-shaped ditch network. There was a yellow-green substance in a ditch connecting the ponds immediately east to the network. No discoloration was recorded in this network.
	"July Night" -	This network was imaged as being quite warm, shown in Figure 18.
A-37	April -	There was a dark brown outflow from this ditch. There was no measureable plume or dispersion pattern in the Bay.
	July -	Same indication.

1560 II NE
(FAIRFIELD SOUTH)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

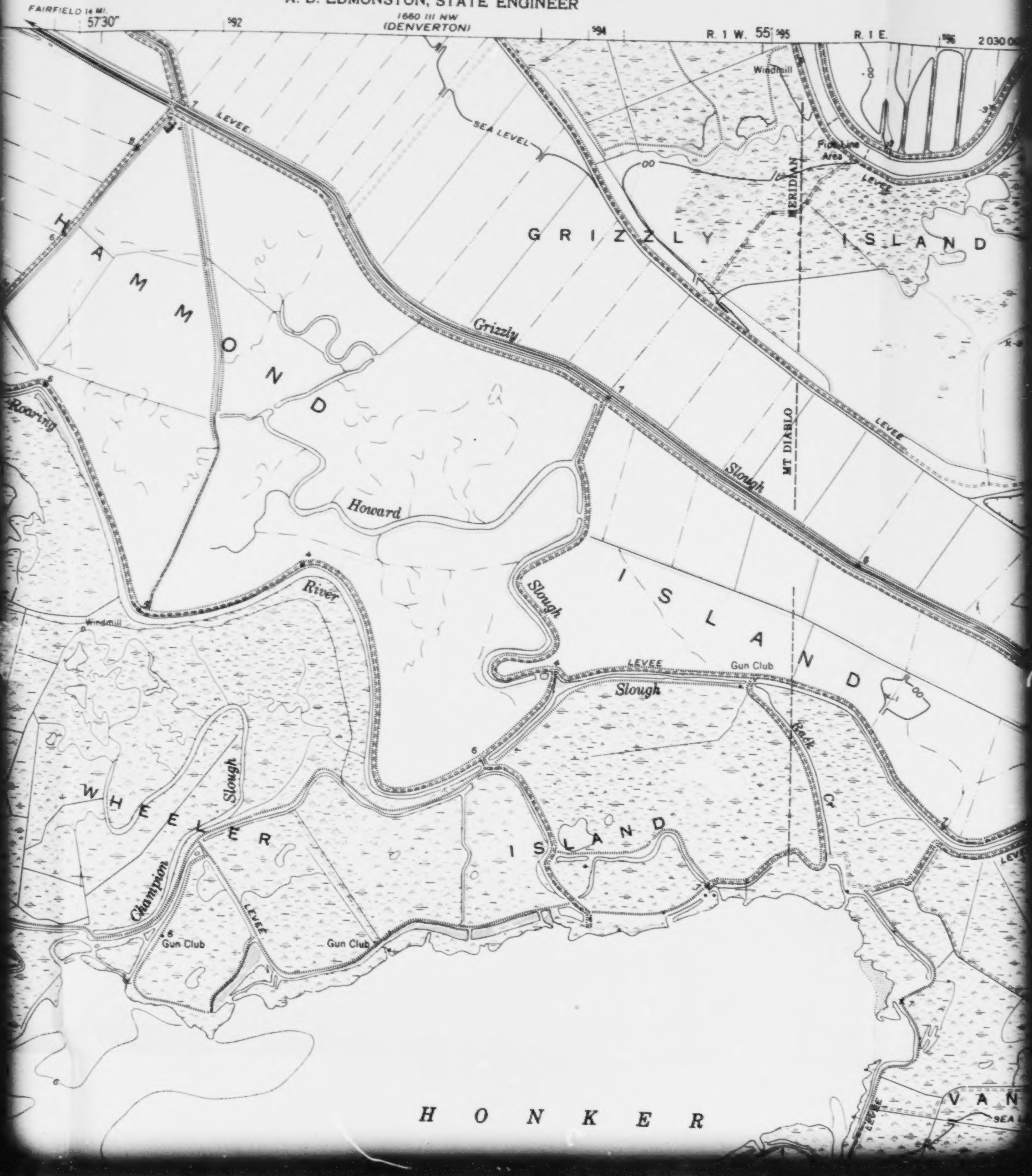
FRANK



122°00'
38°07'30"
588
1 570 000 FEET (3)
589000m E.
590
FAIRFIELD 14 MI.
57'30"
592
4219000m N.
590 000
FEET (3)
4218
4217
4216
5'
4215
4214
GRIZZLY
BAY
MUD
Pelican
Point
SIMMONS
ISLAND
Norther
Slough
Noyce
Slough
Gun Club
Roaring
LEVEE
HAMMON
Windmill
LEVEE
Mud
Slough
WHEELER
Slough
Champion
Gun Club
LEVEE
SUISUN
CUTOFF
Ryer
Island
Freeman
Island
Tract 38
Gun
Club
DUTTON
ISLAND
Gun Club
Snag
Island
Tract
37
Point Palo Alto
18
12
6

STATE OF CALIFORNIA
GOODWIN J. KNIGHT, GOVERNOR
FRANK B. DURKEE, DIRECTOR OF PUBLIC WORKS
A. D. EDMONSTON, STATE ENGINEER

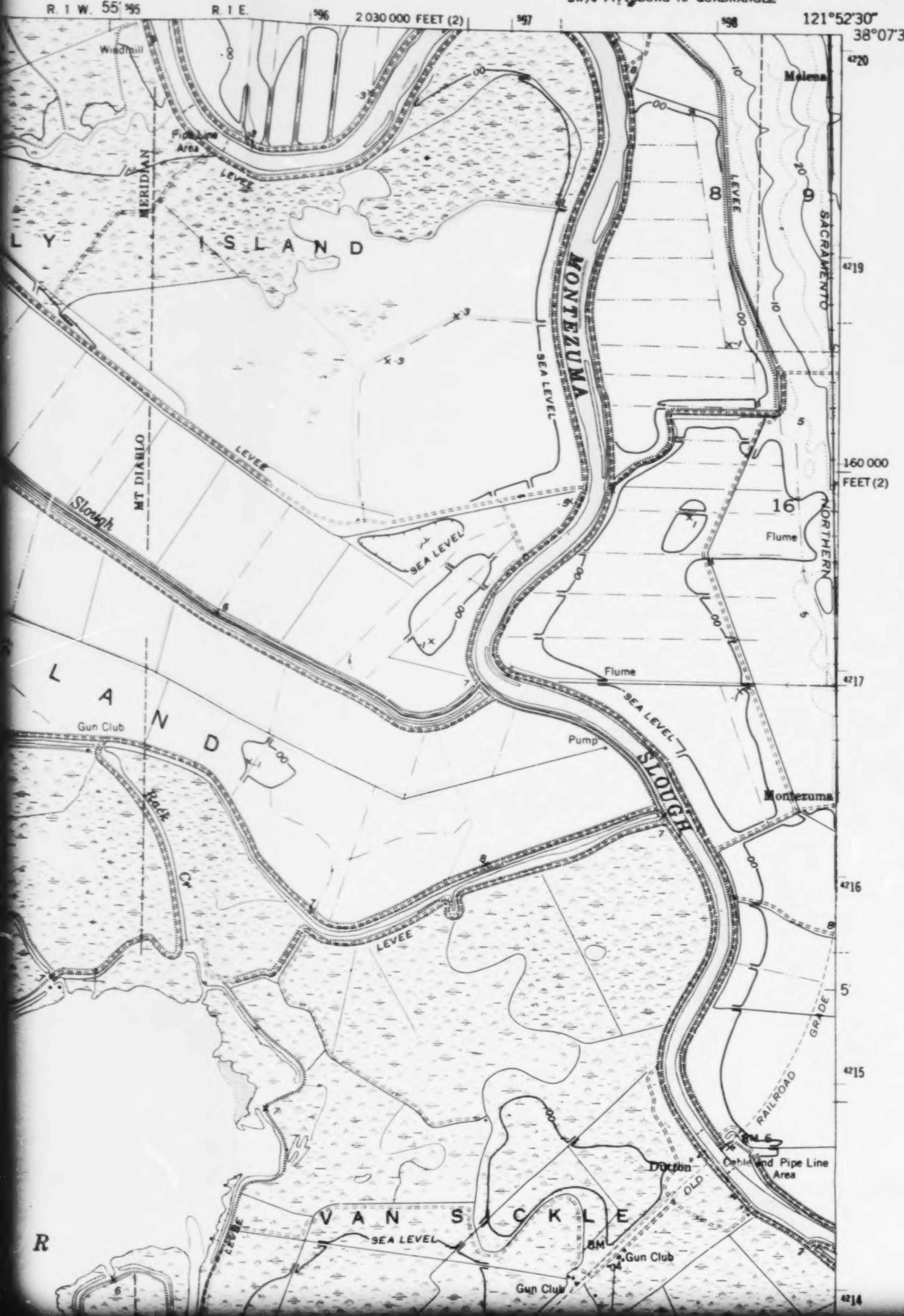
42-1

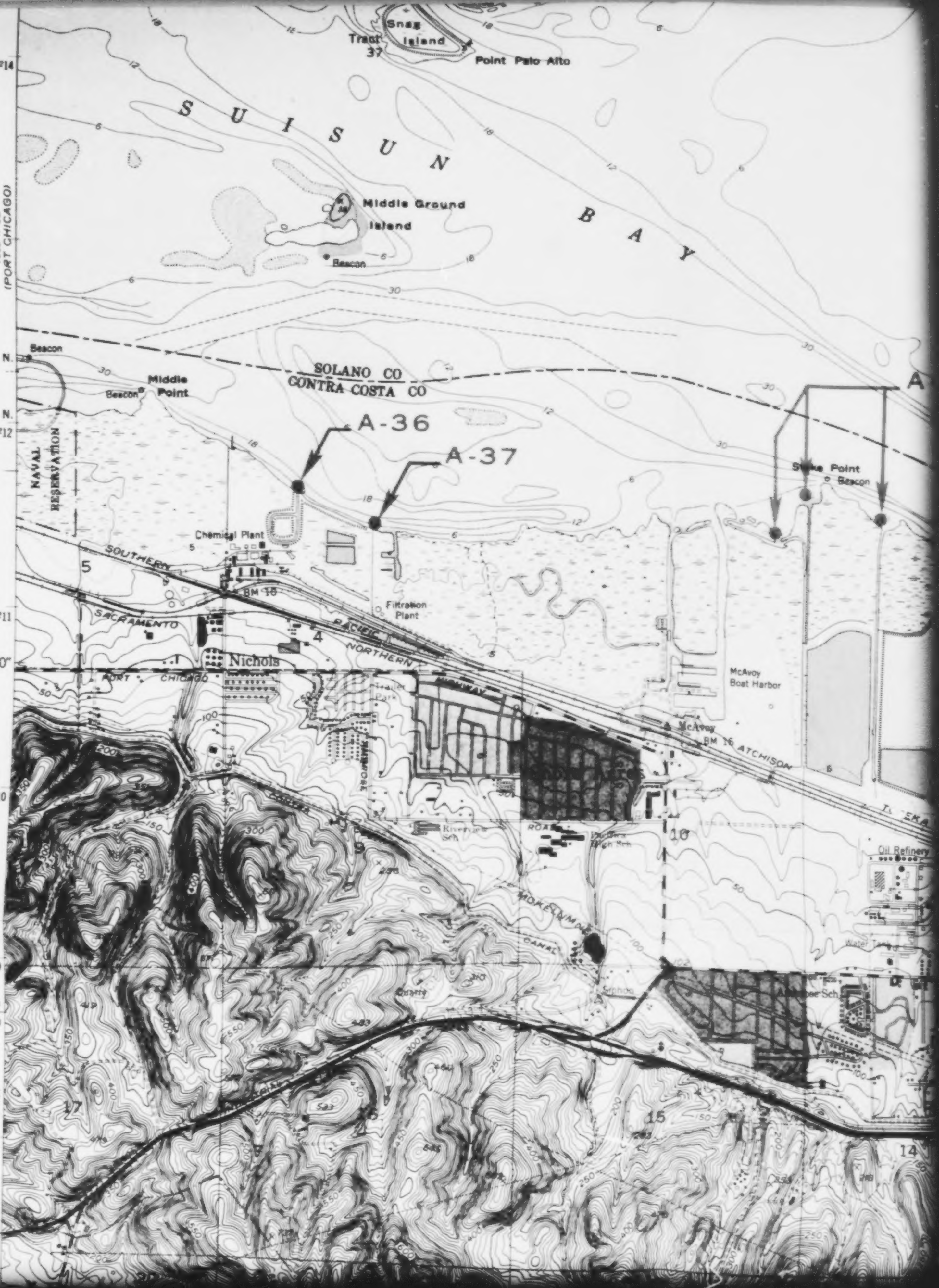

FAIRFIELD 14 MI.
57'30"
592
1660 III NW
(DENVERTON)
594
R. 1 W.
55'
595
R. 1 E.
596
2 030 000
LEVEE
SEA LEVEL
Windmill
Pipe Line Area
MERIDIAN
MT DIABLO
GRIZZLY ISLAND
HAMMOND ISLAND
Grizzly Slough
Howard Slough
Roaring River
Slough
Gun Club
Back Cr
WHEELER ISLAND
Champion Slough
Gun Club
Gun Club
HONKER
VAN
SEA L

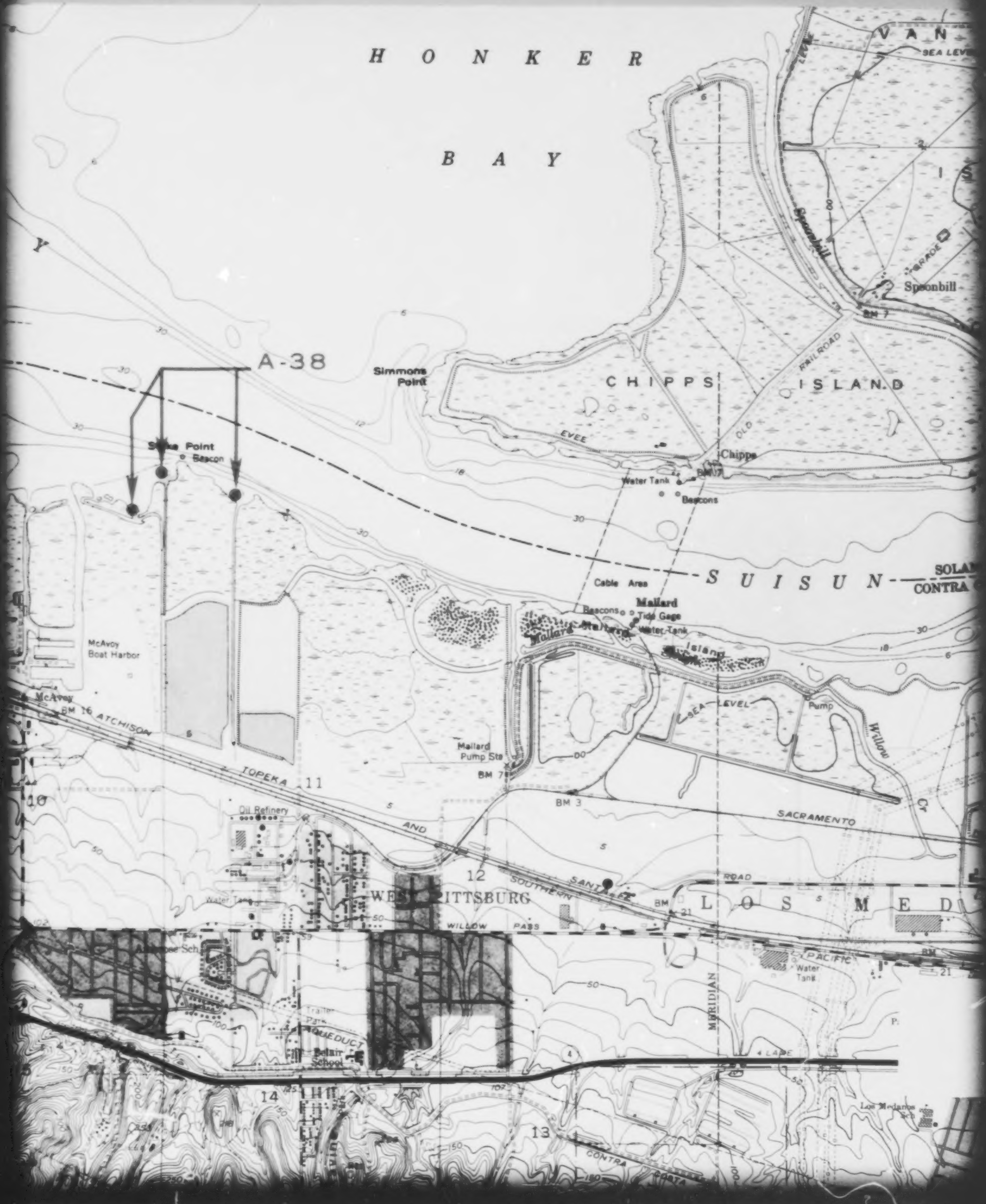
42-A

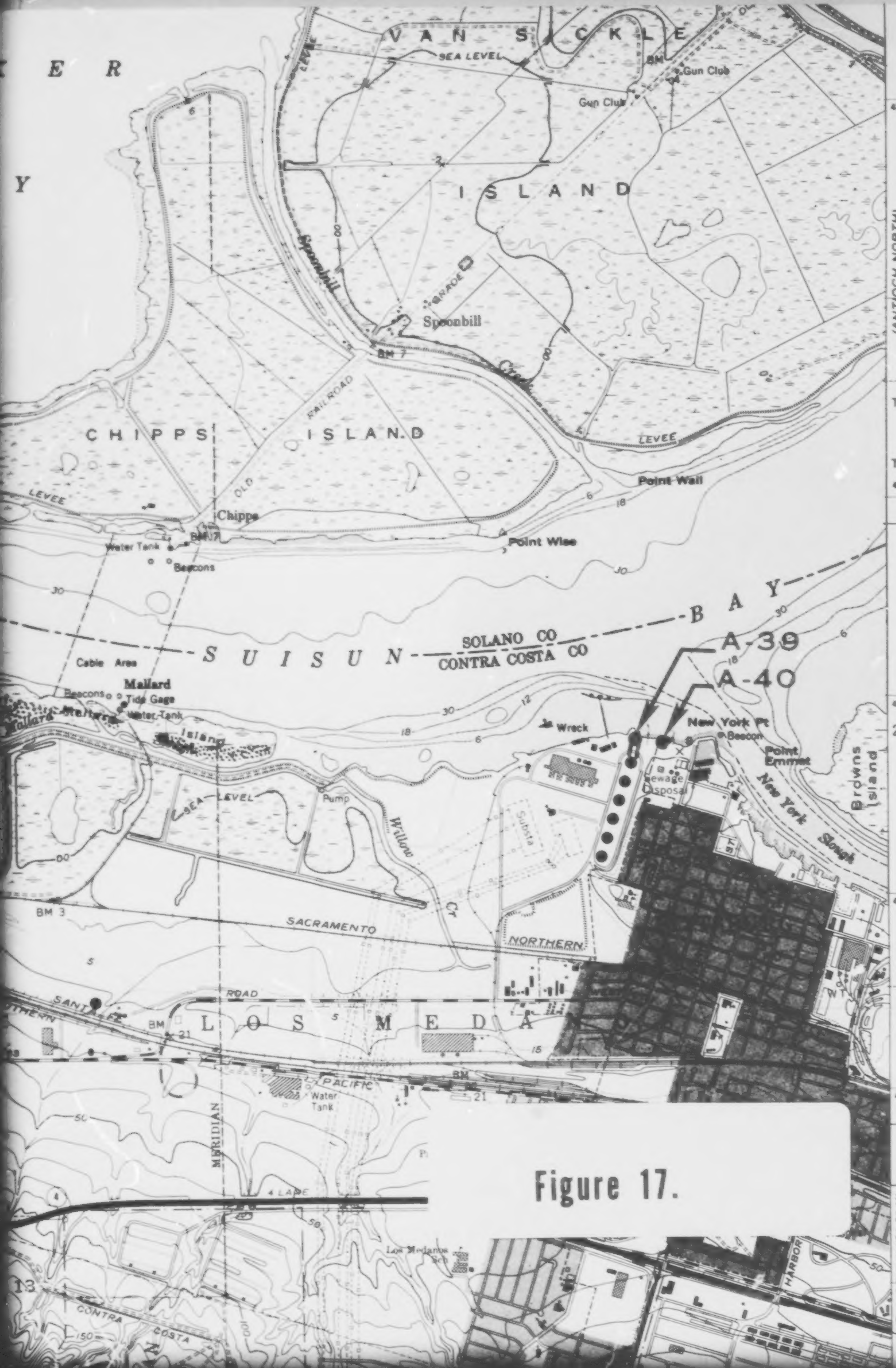
HONKER BAY QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 PITTSBURG 15' QUADRANGLE

1660 III NE
(BIRDS LANDING)


R. 1 W.
R. 1 E.
55'
2 030 000 FEET (2)
121°52'30"
38°07'30"
4220
4219
4217
4216
4215
4214
160 000 FEET (2)
Windmill
Firing Line Area
MERIDIAN
MT DIABLO
LEVEE
ISLAND
LAND
Slough
SEA LEVEL
MONTEZUMA
SLOUGH
Molena
8
9
16
SACRAMENTO
NORTHERN
Flume
Pump
Gun Club
Montezuma
Hack Cr
RAILROAD
GRADE
OLD
Dutton
BM 6
Cable and Pipe Line Area
VAN SICKLE
BM
R

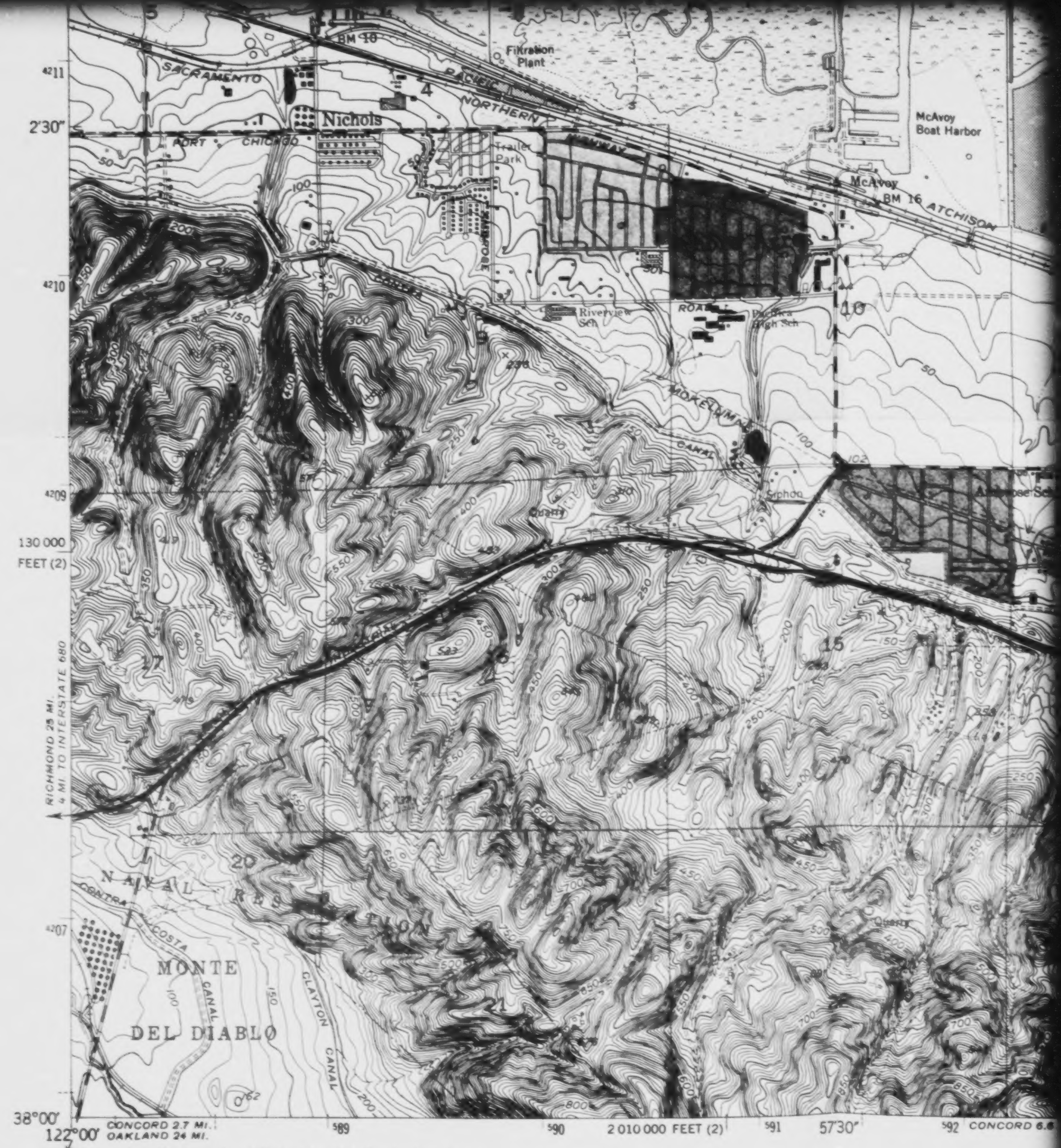

Snag Island
Tract 37
Point Palo Alto
4214
SUISUN BAY
1560 II SE (PORT CHICAGO)
Middle Ground Island
Beacon
T. 3 N.
Beacon
Middle Point
SOLANO CO
CONTRA COSTA CO
T. 2 N.
4212
NAVAL RESERVATION
A-36
A-37
A
Stake Point
Beacon
Chemical Plant
5
SOUTHERN PACIFIC
BM 10
SACRAMENTO NORTHERN
Filtration Plant
4211
4
2'30"
Nichols
PORT CHICAGO HIGHWAY
Trailer Park
McAvoy Boat Harbor
McAvoy
BM 16
ATCHISON TOPEKA
4210
Riverview Sch
High Sch
10
9
Oil Refinery
MOKELUMNE CANAL
Water Tank
4209
130 000 FEET (2)
Quarry
School
Ambrose Sch
17
16
15
14
RICHMOND 25 MI. 4 MI. TO INTERSTATE 680


HONKER
BAY
VAN
IS
Spoonbill
SEA LEVEL
GRADE
BM 7
A-38
Simmons Point
CHIPPS ISLAND
LEVEE
OLD RAILROAD
Chipps
Stake Point
Beacon
Water Tank
BM 7
Beacons
SUISUN
SOLANO
CONTRA C
Cable Area
Mallard
Beacons
Tide Gage
Water Tank
Mallard Slough
Island
SEA LEVEL
Pump
Willow Cr
McAvoy Boat Harbor
McAvoy
BM 16
ATCHISON
TOPEKA
AND
SANTA FE
SOUTHERN
PACIFIC
Mallard Pump Sta
BM 7
BM 3
SACRAMENTO
ROAD
Oil Refinery
WEST PITTSBURG
Water Tank
WILLOW PASS
LOS MEDANOS
BM 21
Water Tank
MERIDIAN
Trailer Park
AQUEDUCT
Belair School
4 LANE
Los Medanos Sch
CONTRA COSTA
10
11
12
13
14
15



A-39
A-40
VAN SICKLE ISLAND
CHIPPS ISLAND
SUISUN BAY
SOLANO CO
CONTRA COSTA CO
Spoonbill Creek
Point Wise
Point Wall
New York Pt
Point Emmet
New York Slough
Browns Island
Sewage Disposal
Chipps
Mallard
Willow Cr
SACRAMENTO NORTHERN
LOS MEDANOS
PACIFIC
MERIDIAN
Los Medanos Sch
Gun Club
T. 3 N.
T. 2 N.
(ANTIOCH NORTH) 1660 III SE
2'30"

Figure 17.


Nichols
Filtration Plant
McAvoy Boat Harbor
McAvoy
BM 10
BM 16
SACRAMENTO
PACIFIC
NORTHERN
ATCHISON
PORT CHICAGO
HIGHWAY
Trailer Park
Riverview Sch
Pittsburg High Sch
Ambrose Sch
CONTRA COSTA CANAL
MOKELUMNE
Siphon
Quarry
NAVAL RESERVATION
MONTE DEL DIABLO
CLAYTON CANAL
RICHMOND 25 MI. 4 MI. TO INTERSTATE 680
4211
4210
4209
4207
2'30"
130 000 FEET (2)
38°00'
122°00'
CONCORD 2.7 MI. OAKLAND 24 MI.
589
590
2 010 000 FEET (2)
591
57'30"
592
CONCORD 6.6
(WALNUT CREEK) 1559 I NE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Culture and drainage in part by USC&GS from aerial photographs taken 1941
Topography by plane-table surveys 1906–07 and by Kelsh plotter methods from aerial photographs taken 1949. Contour revision and field check 1953

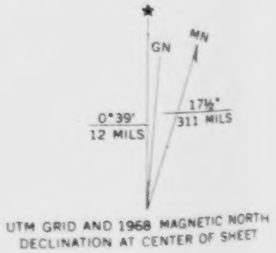
Hydrography compiled from USC&GS Chart 5534

Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system, zones 2 and 3

Dashed land lines indicate approximate locations

Red tint indicates areas in which only landmark buildings are shown

1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

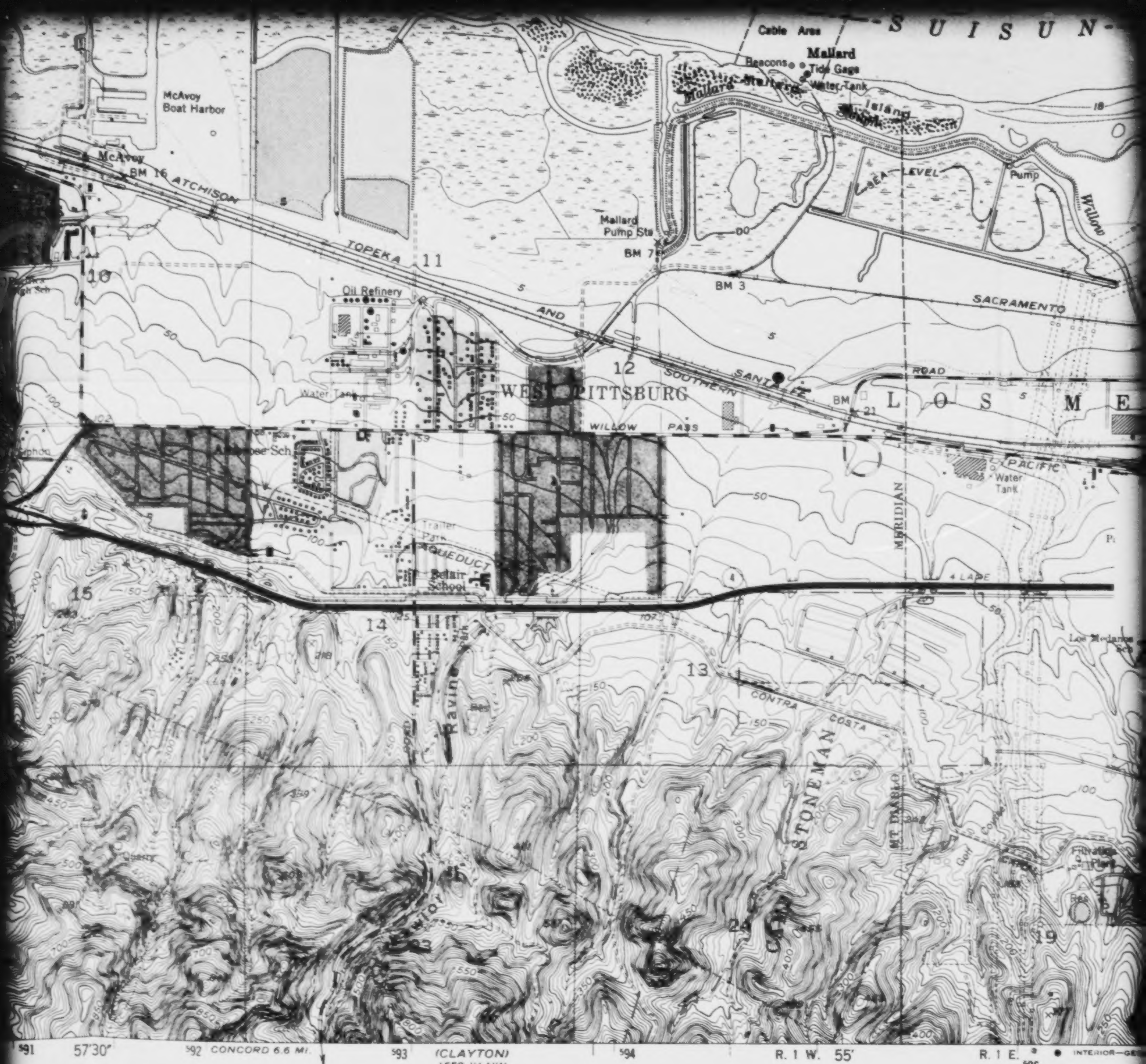

GN
MN
0°39'
12 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

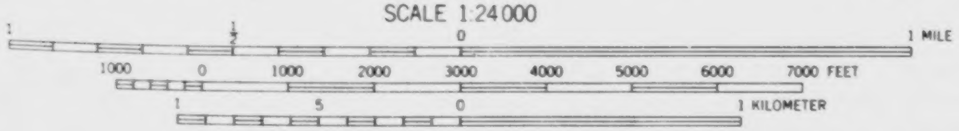
SHOR

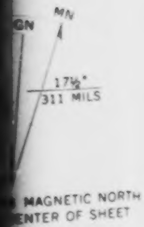
THIS

FOR SALE BY U. S. GEOLO
A FOLDER DESC


S U I S U N
Cable Area
Mallard
Beacons
Tide Gage
Water Tank
Mallard Slough
Island Slough
SEA LEVEL
Pump
Willow
18
McAvoy Boat Harbor
McAvoy
BM 16
ATCHISON
TOPEKA
AND
SANTA FE
Mallard Pump Sta
BM 7
BM 3
SACRAMENTO
NORTHERN
ROAD
Oil Refinery
Water Tank
WEST PITTSBURG
SOUTHERN
PACIFIC
WILLOW
PASS
BM 21
L O S M E
Water Tank
MERIDIAN
Trailer Park
AQUEDUCT
Belair School
4 LANE
Ravine
CONTRA
COSTA
STONEMAN
MT DIABLO
Golf Course
Filtration Plant
Res
Quarry
Los Medanos Sch
10
11
12
13
14
15
24
19
5
50
100
150
200
250
300
350
400
450
500
550
700
800
850
591
57'30"
592
CONCORD 6.6 MI.
593
(CLAYTON)
1659 IV NW
594
R. 1 W.
55'
R. 1 E.
596
INTERIOR—GEO

SCALE 1:24000


1
½
0
1 MILE
1000
0
1000
2000
3000
4000
5000
6000
7000 FEET
1
.5
0
1 KILOMETER


GN
MN
17½°
311 MILS
MAGNETIC NORTH
ENTER OF SHEET

QUADRANGLE LOCATION

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS
CONTOURS INCOMPLETE ALONG EMBANKMENTS AND DITCHES
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE AVERAGE RANGE OF TIDE IS APPROXIMATELY 4 FEET
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple compiled from aer
taken 1968. This information not field che

Purple tint indicates extension of urban area

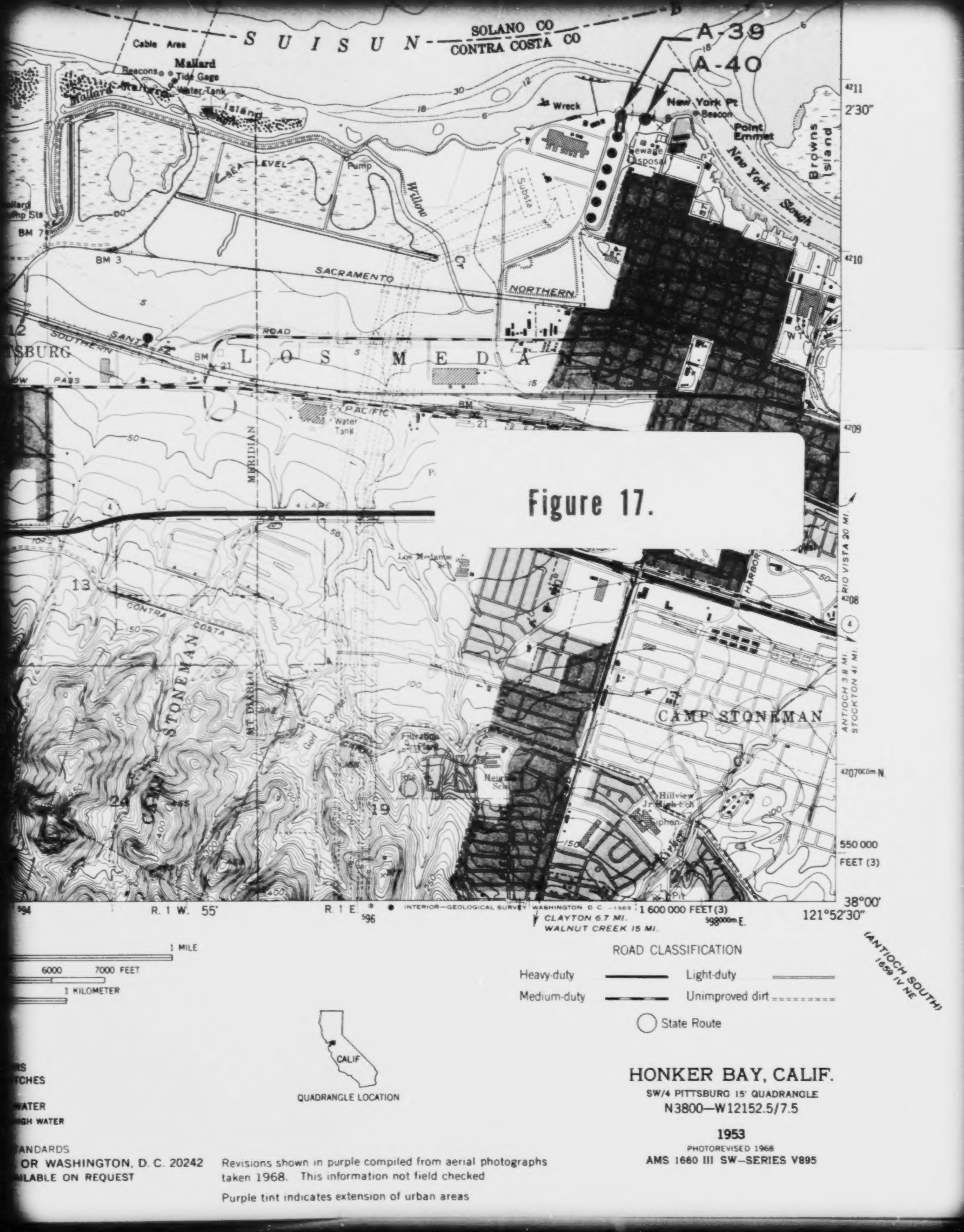
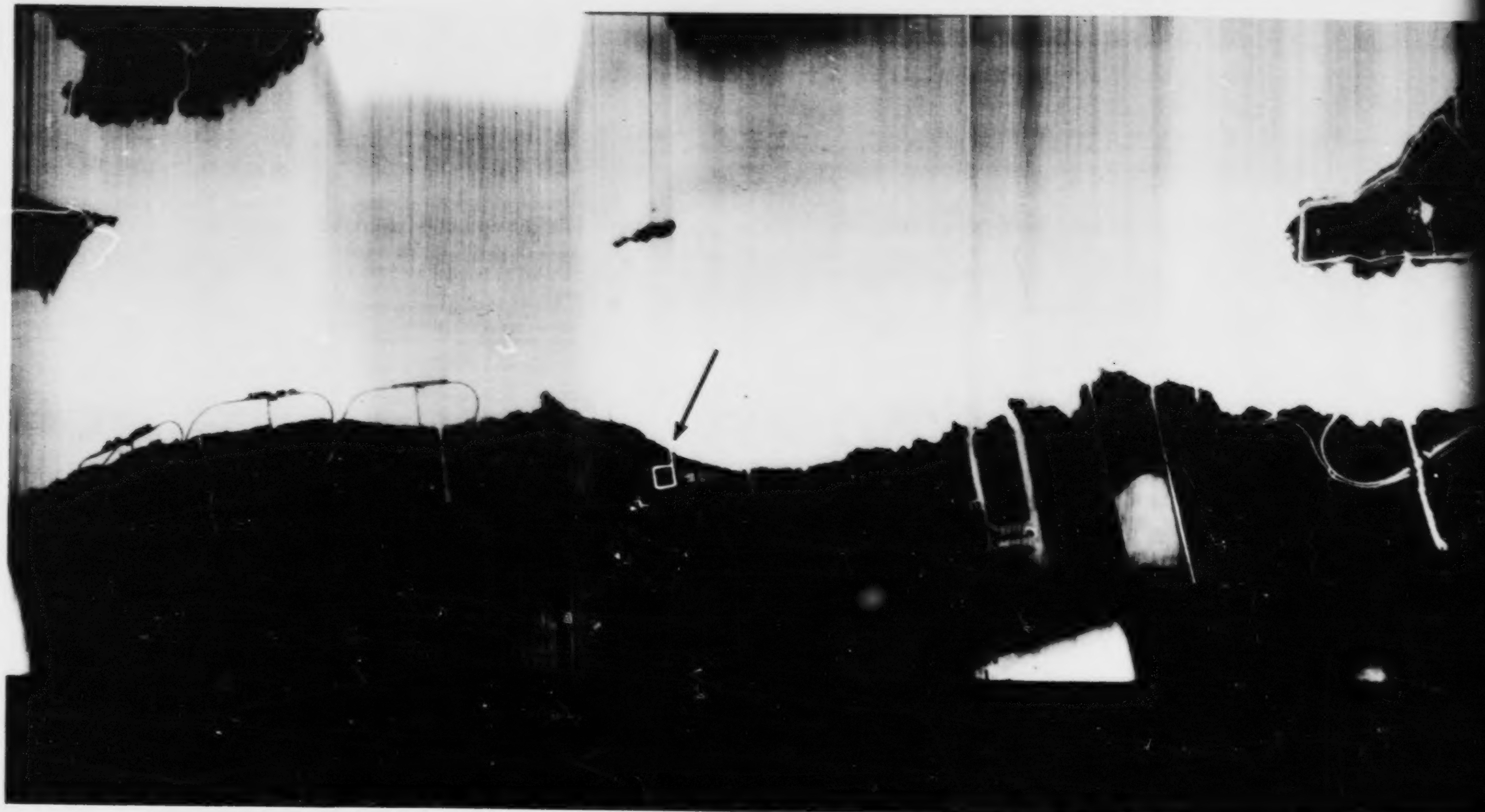

A-39
A-40
SUISUN
SOLANO CO
CONTRA COSTA CO
Cable Area
Mallard
Beacons
Tide Gage
Water Tank
Island
Wreck
New York Pt
Beacon
Point Emmet
Browns Island
New York Slough
Sewage Disposal
Substa
Pump
SEA LEVEL
Willow Cr
Mallard Pump Sta
BM 7
BM 3
SACRAMENTO NORTHERN
SANTA FE
SOUTHERN PACIFIC
ROAD
LOS MEDANOS
PITTSBURG
PASS
BM 21
Water Tank
MERIDIAN
4 LANE
Los Medanos Sch
CONTRA COSTA
STONEMAN
MT DIABLO
Golf Course
Filtration Plant
Res
Heights Sch
CAMP STONEMAN
Hillview Jr High Sch
Siphon
HARBOR
RIO VISTA 20 MI.
ANTIOCH 3.8 MI.
STOCKTON 41 MI.
CLAYTON 6.7 MI.
WALNUT CREEK 15 MI.
4211
2'30"
4210
4209
4208
4207000m N.
550 000 FEET (3)
38°00'
121°52'30"
594
R. 1 W.
55'
R. 1 E.
596
1 600 000 FEET (3)
598000m E.
INTERIOR—GEOLOGICAL SURVEY WASHINGTON D. C.—1969
12
13
19
24
(ANTIOCH SOUTH) 1659 IV NE
1 MILE
6000
7000 FEET
1 KILOMETER
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
State Route
CALIF
QUADRANGLE LOCATION
HONKER BAY, CALIF.
SW/4 PITTSBURG 15' QUADRANGLE
N3800—W12152.5/7.5
1953
PHOTOREVISED 1968
AMS 1660 III SW—SERIES V895
OR WASHINGTON, D. C. 20242
AILABLE ON REQUEST
Revisions shown in purple compiled from aerial photographs taken 1968. This information not field checked
Purple tint indicates extension of urban areas

Figure 17.



42-b

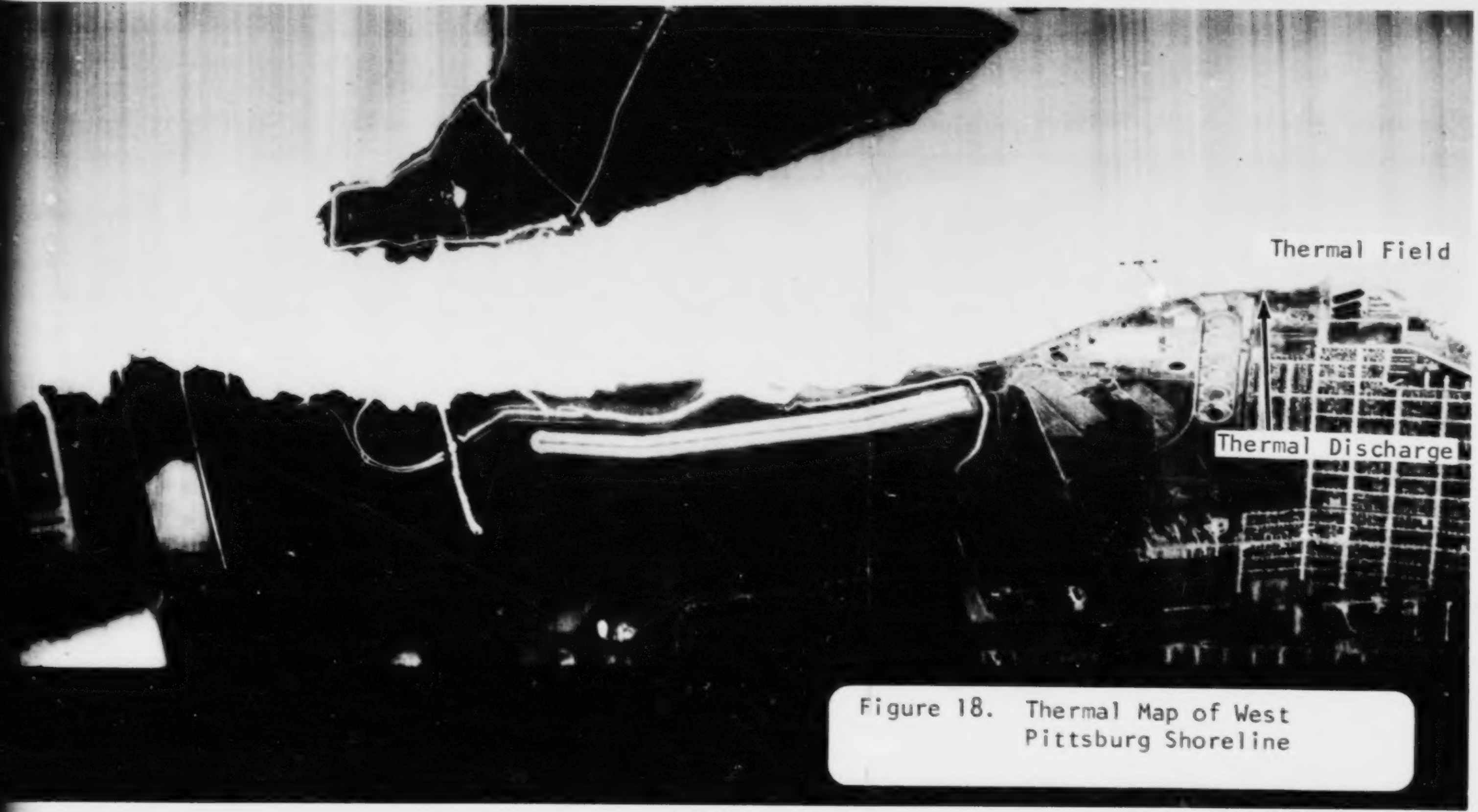

Thermal Field
Thermal Discharge

Figure 18. Thermal Map of West Pittsburg Shoreline

A-38 April - The outflow from these waterways was yellow-brown in color and was high in turbidity. No measureable plumes were observed in the Bay waters.

July - Same indication.

A-39 April - Two submerged outfalls were discharging under pressure. There appeared to be no discoloration in the receiving waters.

A-40 April - A submerged outfall was discharging a dark brown effluent which appeared to be a poorly treated outflow from the adjacent STP.

"July Night" - A warm discharge was causing a moderate sized thermal plume as shown in Figure 18.

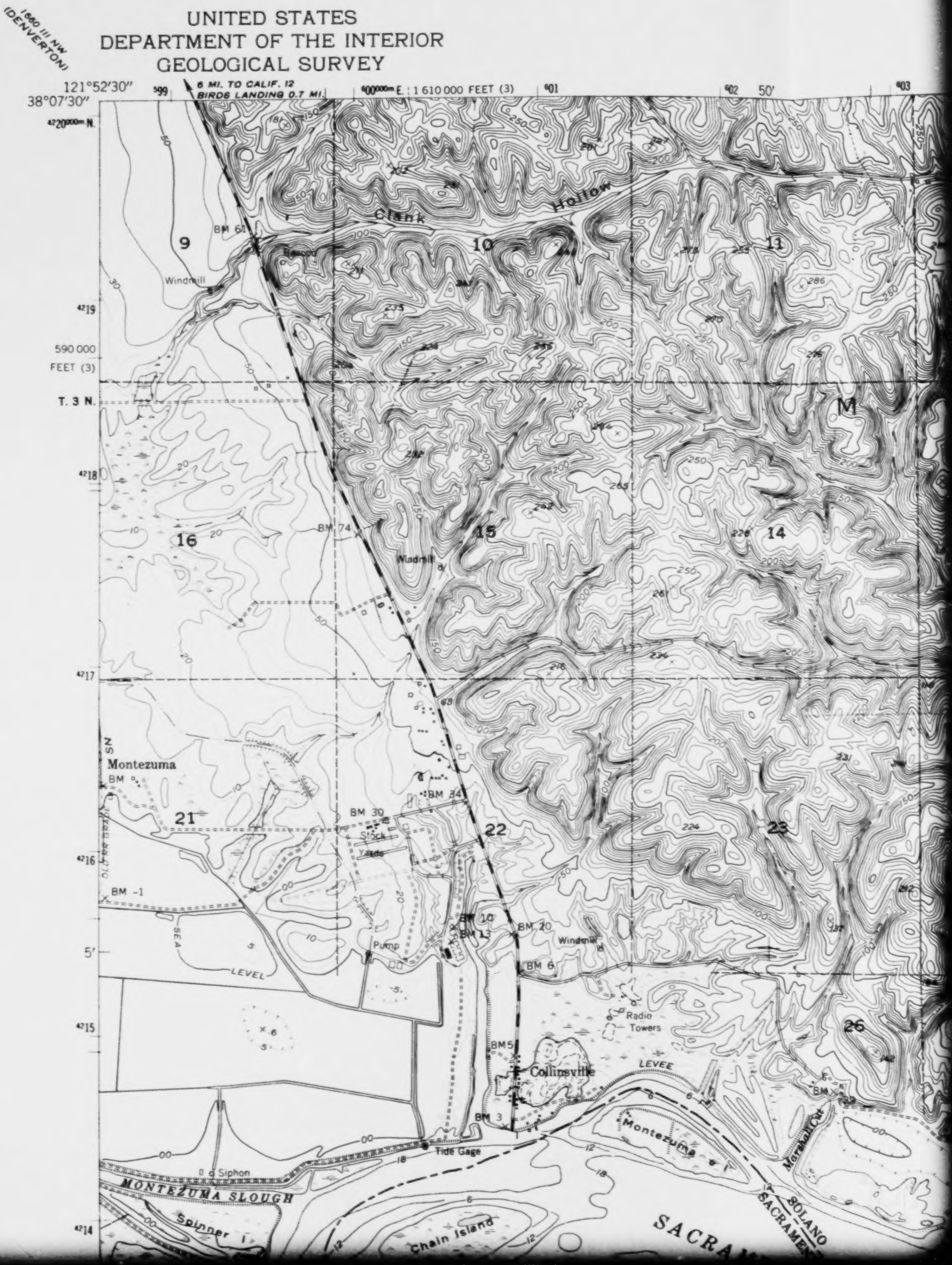
Note: Indication numbers A-41 through A-57 appear on Figure 19, the Antioch North map.

A-41 July - An active outfall was detected here. There was no discoloration or plume in the receiving water.

A-42 April - An outfall just located immediately above the water surface was discharging a reddish-brown colored water. Sun reflection from the capillary wave action in this area prevented the detection of any plume.

July - The outfall was active and the plume extended out into the slough 76 meters (250 feet) and 183 meters (600 feet) down stream.

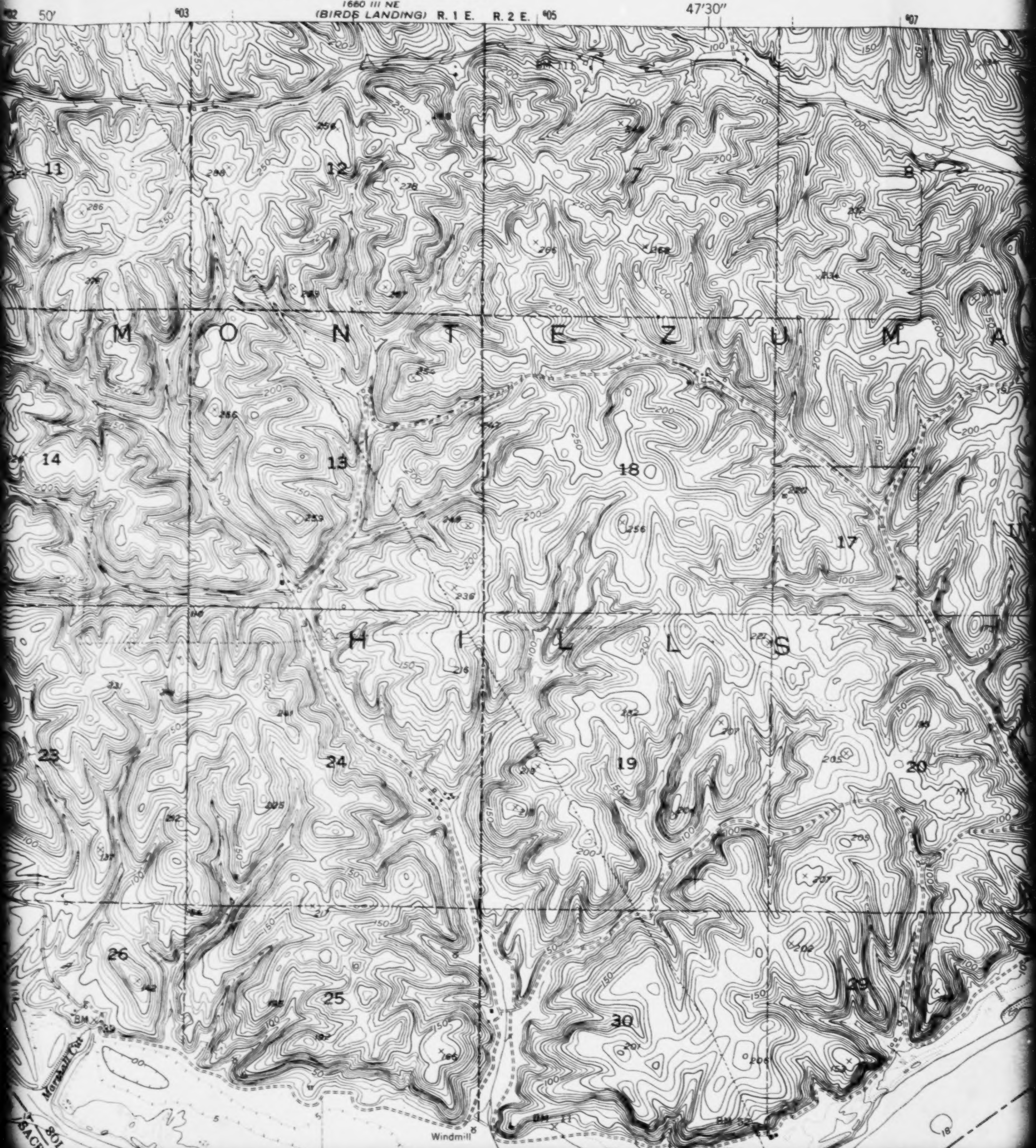
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



1660 III NW
(DENVERTON)
121°52'30"
38°07'30"
6 MI. TO CALIF. 12
BIRDS LANDING 0.7 MI.
599
600000m E.
1 610 000 FEET (3)
601
602
50'
603
4220000m N.
4219
590 000
FEET (3)
T. 3 N.
4218
4217
4216
5'
4215
4214
Clank
Hollow
9
10
11
14
15
16
21
22
23
26
M
BM 61
Windmill
BM 74
BM 34
BM 30
Stock
Yards
BM -1
BM 10
BM 13
BM 20
BM 6
BM 5
BM 3
BM
Pump
Windmill
Radio
Towers
Montezuma
Collinsville
LEVEE
SEA
LEVEL
Tide Gage
Siphon
MONTEZUMA SLOUGH
Spinner I
Chain Island
Montezuma I
Marshall Cut
SOLANO
SACRAMENTO
SACRAM
OLD RR GRADE

STATE OF CALIFORNIA
REPRESENTED BY THE
DIRECTOR OF PUBLIC WORKS

43-A


50'
1660 III NE
(BIRDS LANDING)
R. 1 E.
R. 2 E.
47'30"
M O N T E Z U M A
H I L L S
11
12
7
8
14
13
18
17
23
24
19
20
26
25
30
29
Windmill
Marshall Cut
SOLANO
SACRA

43-A

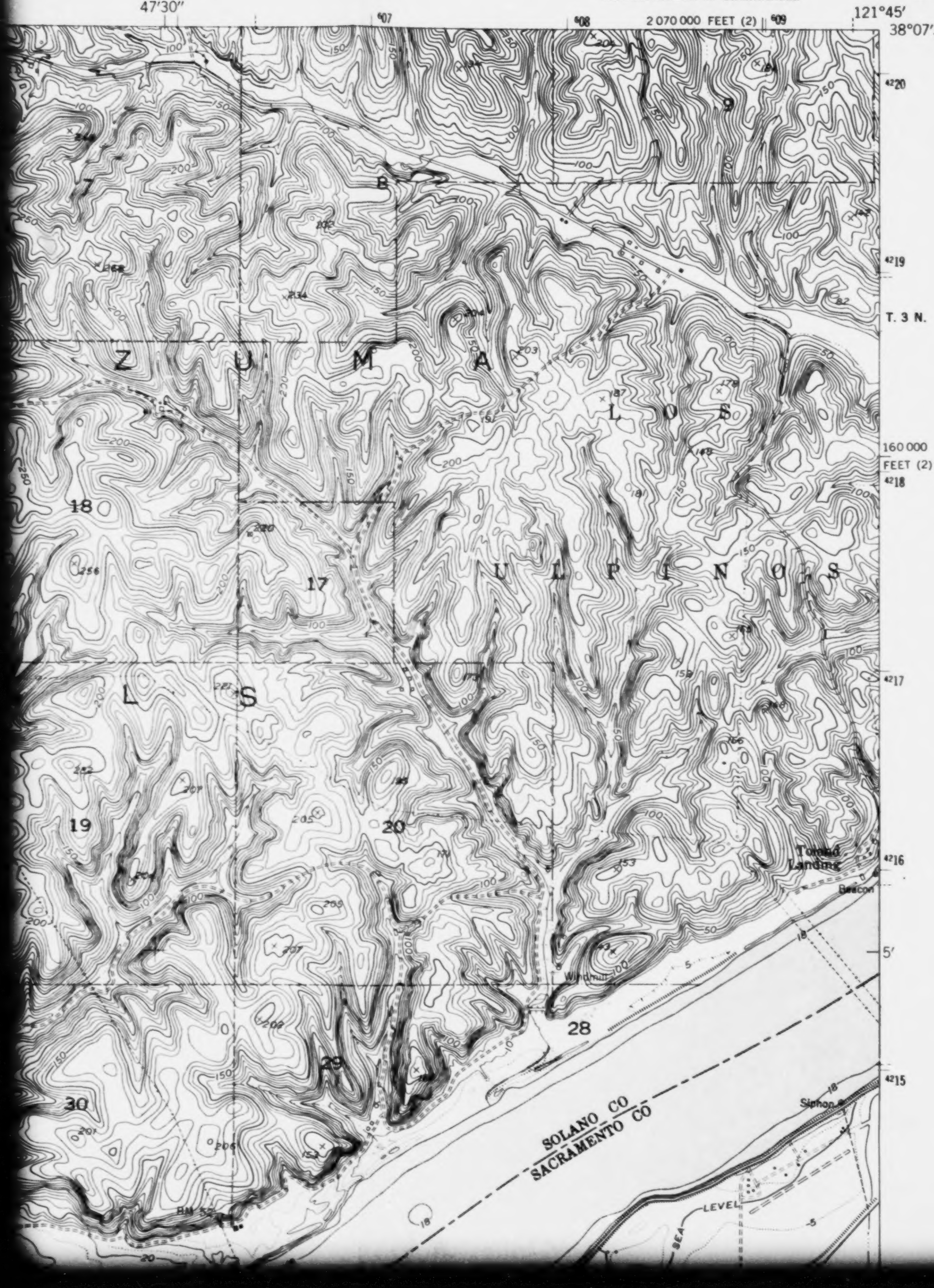
ANTIOCH NORTH QUADRANGLE

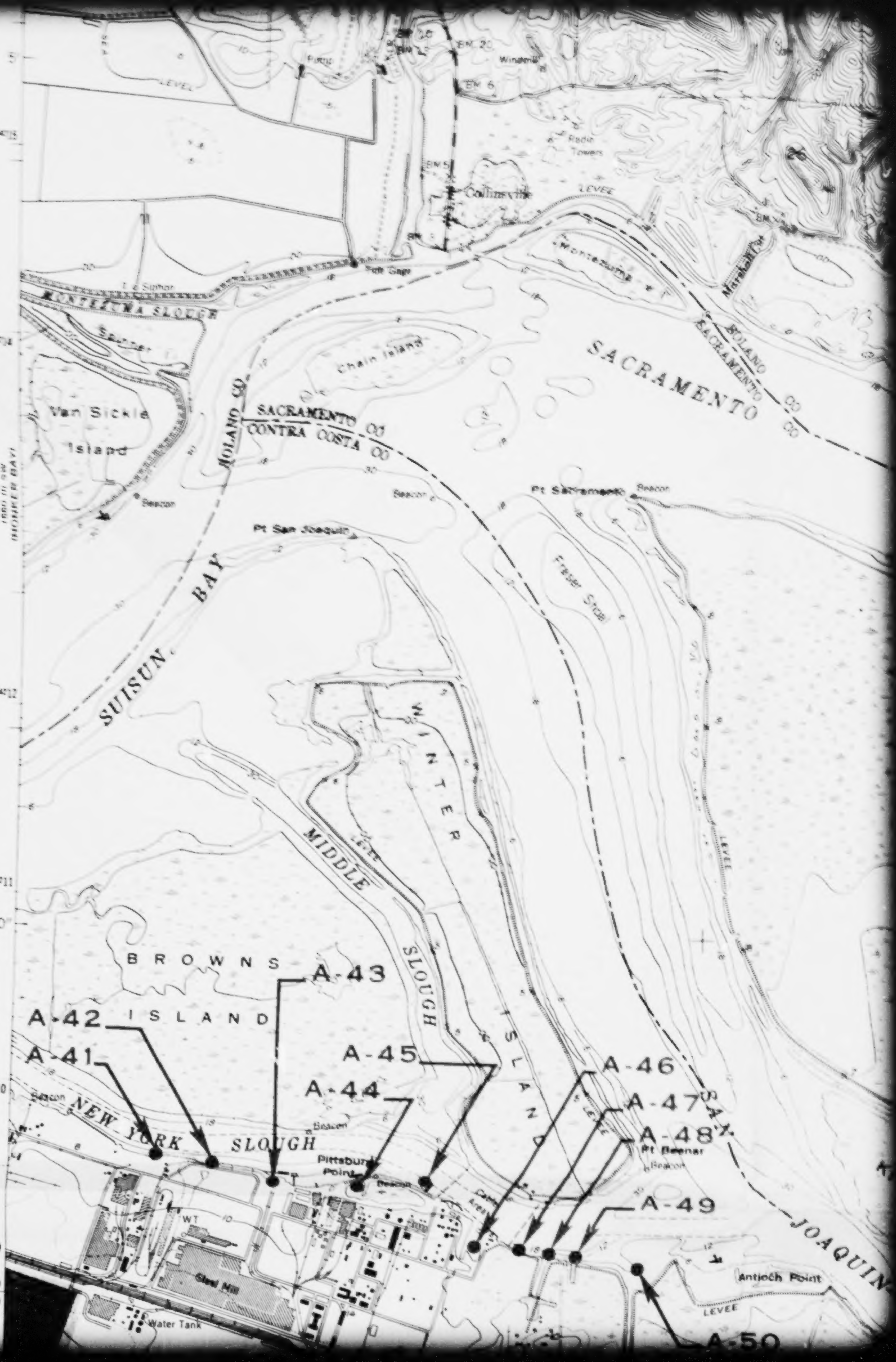
CALIFORNIA

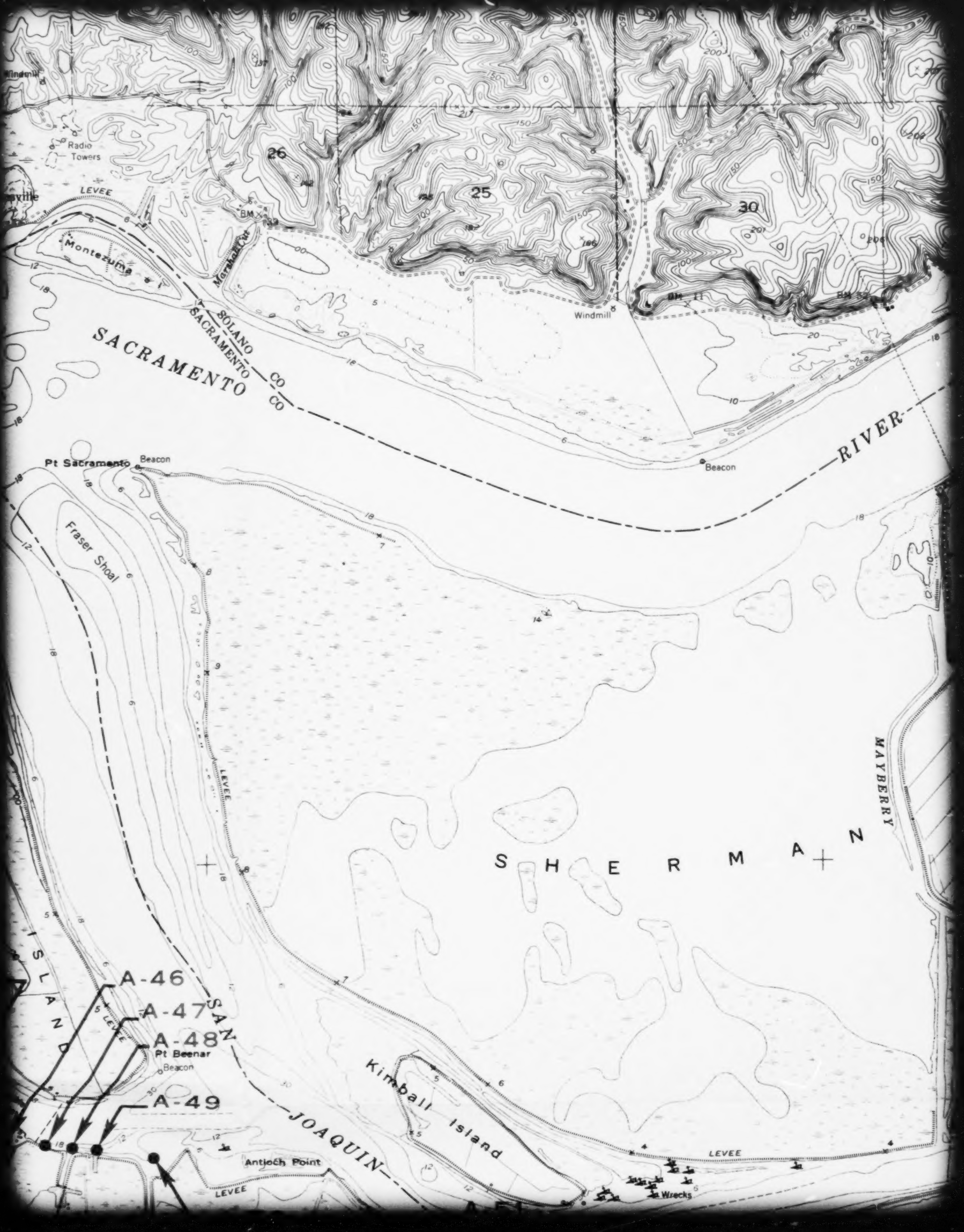
7.5 MINUTE SERIES (TOPOGRAPHIC)

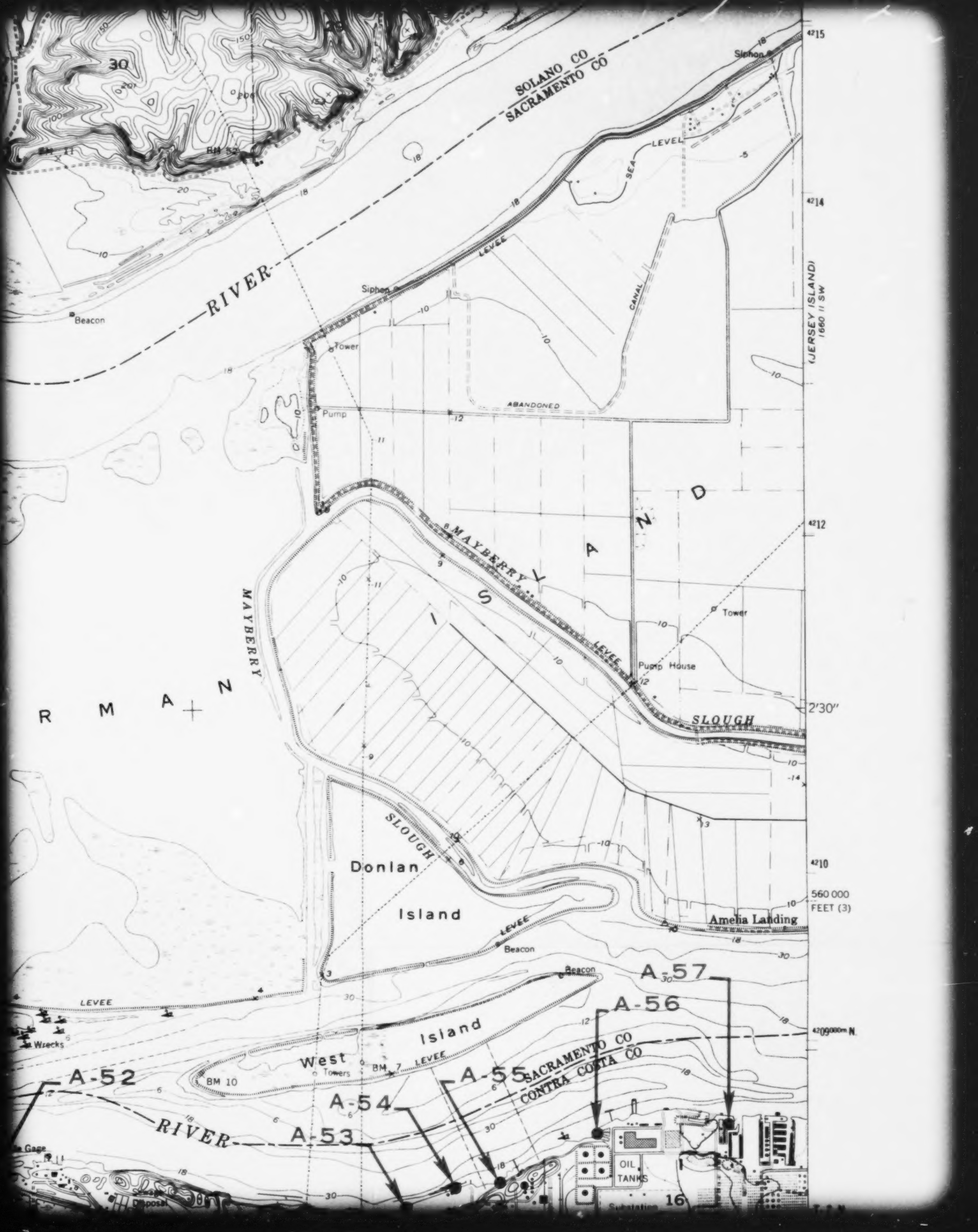
SE/4 PITTSBURG 15' QUADRANGLE

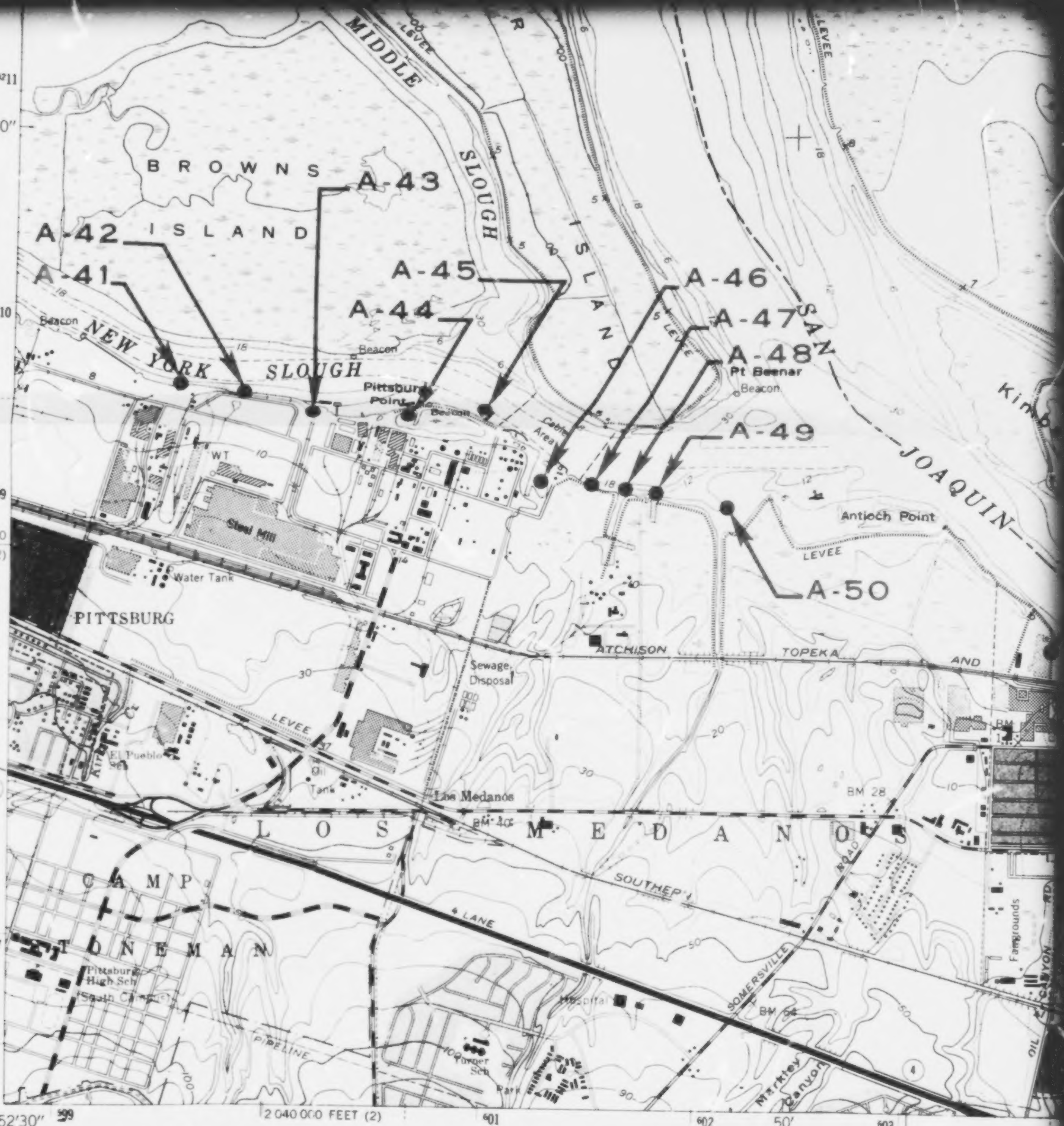
1660 II NW
(RIO VISTA)


47'30"
607
608
2 070 000 FEET (2)
609
121°45'
38°07'30"
4220
4219
T. 3 N.
160 000
FEET (2)
4218
4217
4216
5'
4215
LOS
MEDANOS
ULPINOS
ZUMA
7
8
9
17
18
19
20
28
29
30
Toland Landing
Beacon
Windmill
Siphon
SOLANO CO
SACRAMENTO CO
SEA LEVEL
BM 52
100
150
200
250
50


A-41
A-42
A-43
A-44
A-45
A-46
A-47
A-48
A-49
A-50
SUISUN BAY
SACRAMENTO
JOAQUIN
MONTEZUMA SLOUGH
NEW YORK SLOUGH
MIDDLE SLOUGH
BROWNS ISLAND
WINTER ISLAND
Van Sickle Island
Chain Island
Collinsville
Pt San Joaquin
Pt Sacramento
Fraser Shoal
Pittsburg Point
Pt Beenar
Antioch Point
Steel Mill
Water Tank
SOLANO CO
SACRAMENTO CO
CONTRA COSTA CO
Radio Towers
Windmill
Beacon
LEVEE
2'30"
130 000 FEET (2)


Windmill
Radio Towers
LEVEE
Montezuma
Marshall Cut
26
25
30
BM
Windmill
SOLANO CO
SACRAMENTO CO
SACRAMENTO RIVER
Pt Sacramento
Beacon
Beacon
Fraser Shoal
LEVEE
SHERMAN
MAYBERRY
ISLAND
SAN JOAQUIN
A-46
A-47
A-48
A-49
Pt Beenar
Beacon
Kimball Island
Antioch Point
LEVEE
LEVEE
Wrecks


30
SOLANO CO
SACRAMENTO CO
Siphon
SEA LEVEL
RIVER
Beacon
Siphon
LEVEE
CANAL
Tower
Pump
ABANDONED
(JERSEY ISLAND)
1660 II SW
4215
4214
4212
4210
MAYBERRY
LEVEE
I S L A N D
MAYBERRY
R M A N
Tower
Pump House
2'30"
SLOUGH
SLOUGH
Donlan
Island
LEVEE
Beacon
Beacon
Amelia Landing
560 000
FEET (3)
LEVEE
Wrecks
West
Island
Towers
BM 7
BM 10
LEVEE
4209000m N.
SACRAMENTO CO
CONTRA COSTA CO
RIVER
A-52
A-53
A-54
A-55
A-56
A-57
OIL
TANKS
Substation
16
Gage
Disposal


A-41
A-42
A-43
A-44
A-45
A-46
A-47
A-48
A-49
A-50
BROWNS ISLAND
NEW YORK SLOUGH
MIDDLE SLOUGH
SAN JOAQUIN
Pittsburg Point
Pt Beenar
Antioch Point
Steel Mill
Water Tank
PITTSBURG
Sewage Disposal
ATCHISON TOPEKA AND
LOS MEDANOS
CAMP STONEMAN
Pittsburg High Sch
SOUTHERN
4 LANE
SOMERSVILLE ROAD
Markley Canyon
Fairgrounds
BM 28
BM 64
Hospital
PIPELINE
LEVEE
Beacon
OAKLAND (BAY BRIDGE) 39 MI
130 000 FEET (2)
2 040 000 FEET (2)
2'30"
38°00'
121°52'30"
50'

(CLAYTON)
1659 IV NW

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Culture and drainage in part by USC&GS from aerial photographs taken 1931-32 and 1941

Topography by plane-table surveys 1906-07 and by Kelsh plotter methods from aerial photographs taken 1949. Contour revision and field check 1953

Hydrography compiled from USC&GS charts 5527 and 5534

Polyconic projection. 1927 North American datum
10,000-foot grids based on California coordinate system, zones 2 and 3

Red tint indicates areas in which only landmark buildings are shown

Dashed land lines indicate approximate locations

Land grant boundaries which follow the banks of the Sacramento and San Joaquin Rivers are not shown

1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

GN
MN
0°44'
13 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

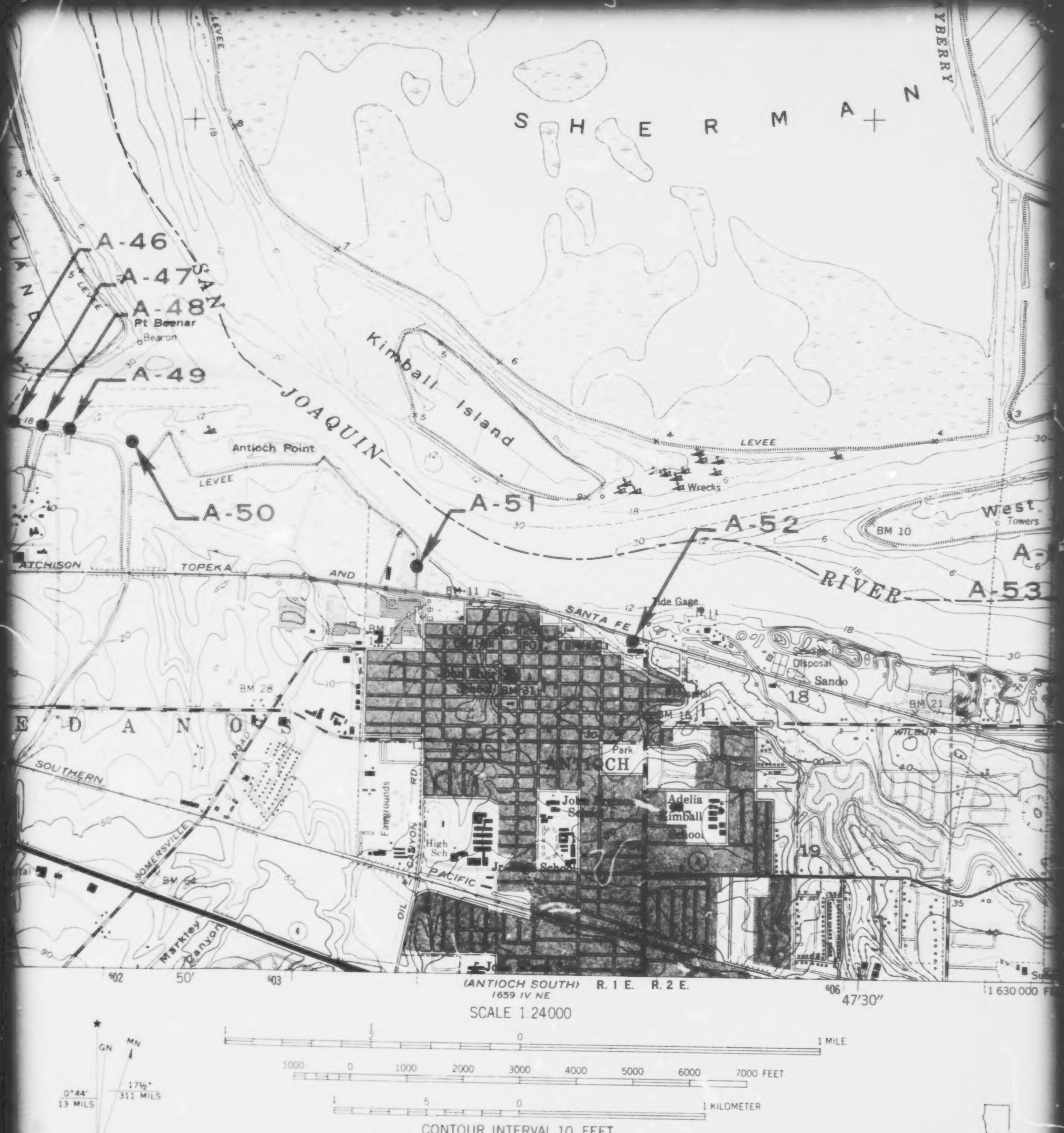
Revisions shown in purple compiled from aerial photographs taken 1968. This information not field checked

Purple tint indicates extension of urban areas

DOTTED LI
CONTOURS IN

DEPTH CURVES
SHORELINE SHOWN
THE AVERAGE RANGE OF TIDE IS APPRO

THIS MAP COMPLI
FOR SALE BY U. S. GEOLOGICAL SU
A FOLDER DESCRIBING TOPO


SHERMAN
A-46
A-47
A-48
A-49
A-50
A-51
A-52
A-53
SAN JOAQUIN RIVER
Kimball Island
Pt Beenar
Antioch Point
LEVEE
Wrecks
West
Towers
BM 10
ATCHISON TOPEKA AND SANTA FE
BM 11
Tide Gage
Sewage Disposal
Sando
BM 28
BM 31
BM 21
ANTIOCH
Park
Adelia Kimball School
High Sch
Fairgrounds
SOUTHERN PACIFIC
SOMERSVILLE ROAD
CANYON RD
Markley Canyon
WILBUR
18
19
602
50′
603
606
47′30″
1 630 000 FE
(ANTIOCH SOUTH) 1659 IV NE
R. 1 E. R. 2 E.
GN
MN
0°44′ 13 MILS
17½° 311 MILS
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
CALIF
QUADRANGLE LOCA

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS
CONTOURS INCOMPLETE ALONG EMBANKMENTS AND DITCHES
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE AVERAGE RANGE OF TIDE IS APPROXIMATELY 3.5 FEET IN SACRAMENTO RIVER AND 3 FEET IN SAN JOAQUIN RIVER

GRID AND 1968 MAGNETIC NORTH
ECLINATION AT CENTER OF SHEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

from aerial photographs
field checked
rban areas

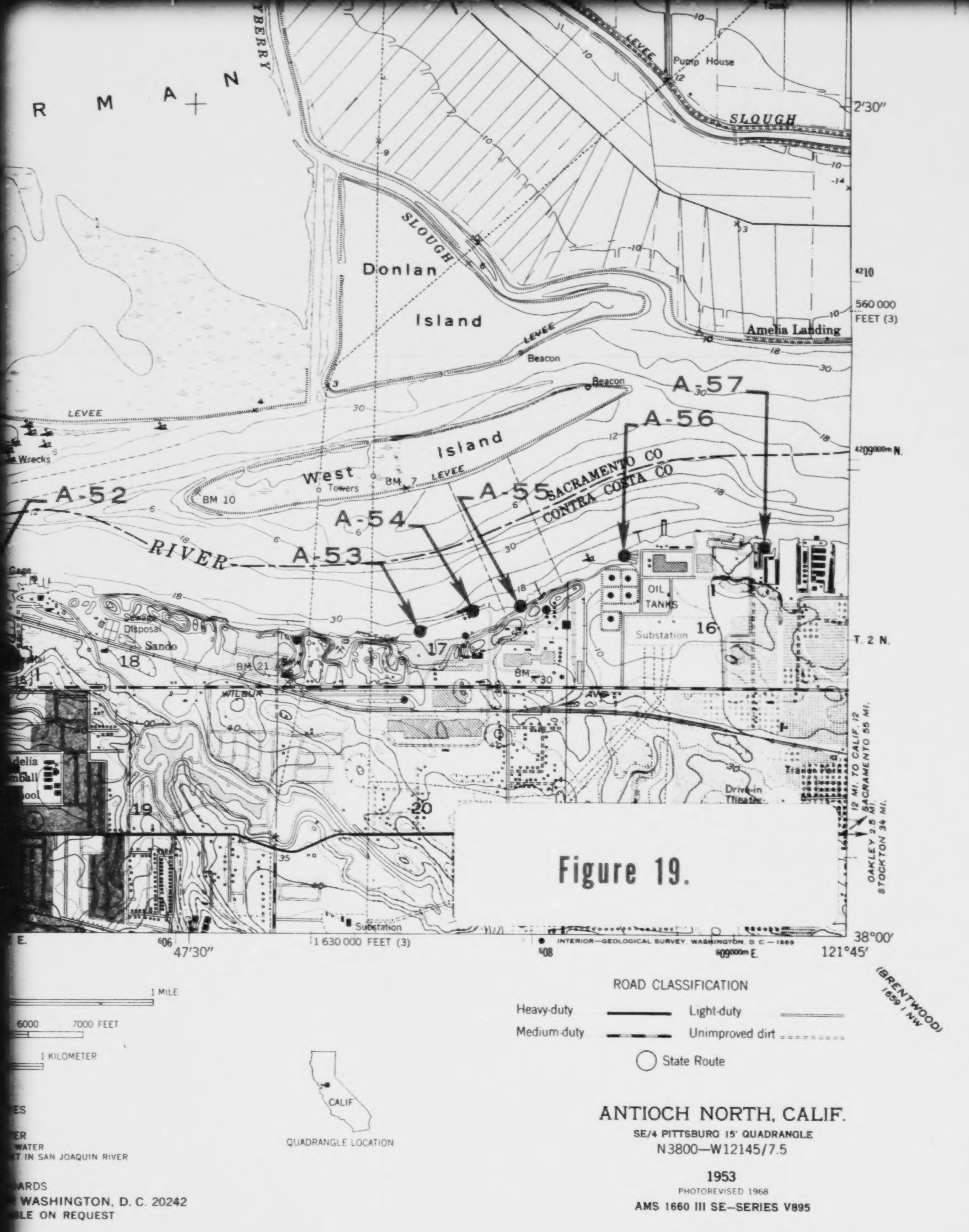

R M A N
BERRY
SLOUGH
Pump House
LEVEE
SLOUGH
2'30"
Donlan
Island
LEVEE
Beacon
Beacon
Amelia Landing
560 000 FEET (3)
4210
A-57
A-56
West
Island
Towers
BM 7
LEVEE
BM 10
LEVEE
Wrecks
A-52
A-55
SACRAMENTO CO
CONTRA COSTA CO
A-54
A-53
RIVER
4209000m N.
Gage
Sewage Disposal
Sando
18
17
16
OIL TANKS
Substation
T. 2 N.
BM 21
BM 30
WILBUR
AVE
Adelia
Kimball
School
19
20
Trailer Park
Drive-in Theater
12 MI. TO CALIF. 12
SACRAMENTO 55 MI.
OAKLEY 2.5 MI.
STOCKTON 34 MI.
Substation
E.
606
47'30"
1 630 000 FEET (3)
608
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D C —1969
609000m E.
38°00'
121°45'
(BRENTWOOD)
1659 I NW
1 MILE
6000
7000 FEET
1 KILOMETER
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
State Route
CALIF
QUADRANGLE LOCATION
WATER
IN SAN JOAQUIN RIVER
WASHINGTON, D. C. 20242
ON REQUEST
ANTIOCH NORTH, CALIF.
SE/4 PITTSBURG 15' QUADRANGLE
N3800—W12145/7.5
1953
PHOTOREVISED 1968
AMS 1660 III SE–SERIES V895

Figure 19.

"July Night" - This outfall was discharging at the time of flight resulting in a small thermal plume. This is shown in Figure 20.

A-43 April - A dark gray-brown substance was being discharged into the slough through a ditch originating within the U.S. Steel Corporation complex. There was no significant discoloration in the receiving water.

July - Same indication.

"July Night" - The thermal imagery recorded a hot discharge from the ditch as shown in Figure 20.

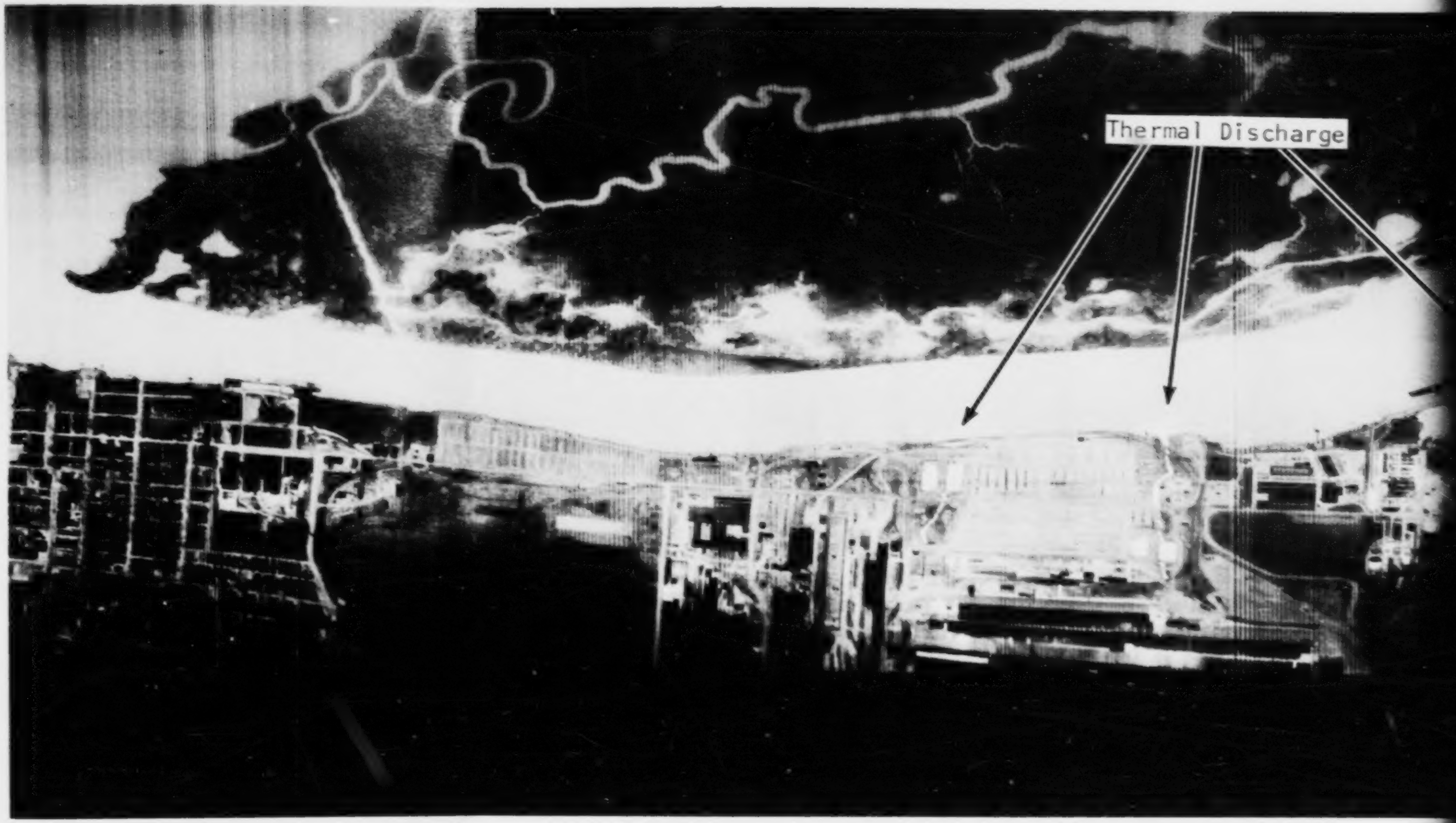
A-44 July - An active outfall was discharging a gray-brown effluent into the pond. There appeared to be no discharge from the pond into the New York Slough.

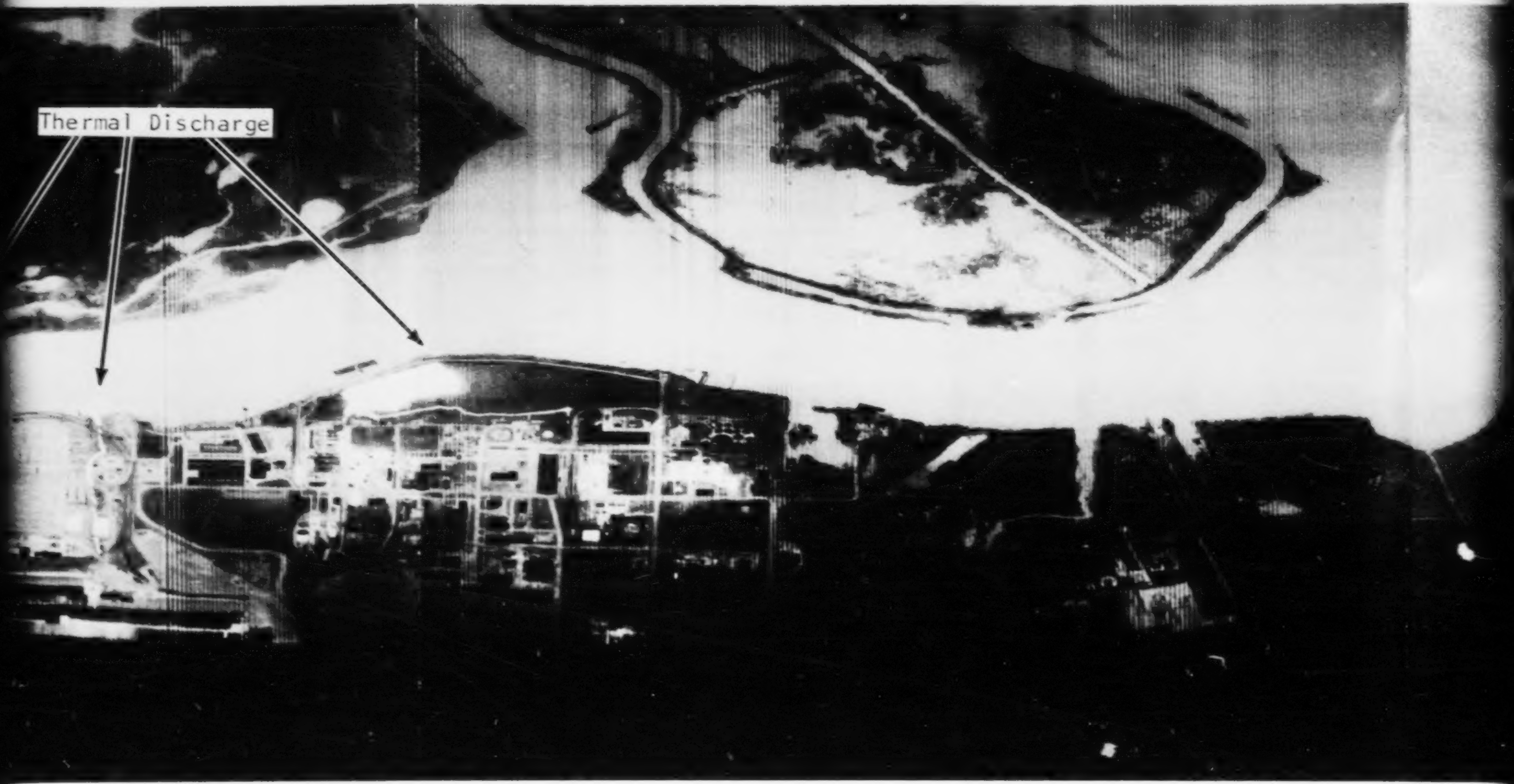
A-45 "July Night" - The pond, mentioned in A-44, was discharging into the slough at the time of flight. The water in the pond and in the effluent were quite warm. The point of discharge is shown in Figure 20.

A-46 April - A large pipe was extending from the bank down to the water. It was not discharging at the time of flight.

July - Same indication as April.

A-47 July - At this location there was a small plume gray-brown in color. The probable source is a pond behind the ditch.


Thermal Discharge


Thermal Discharge

44-A

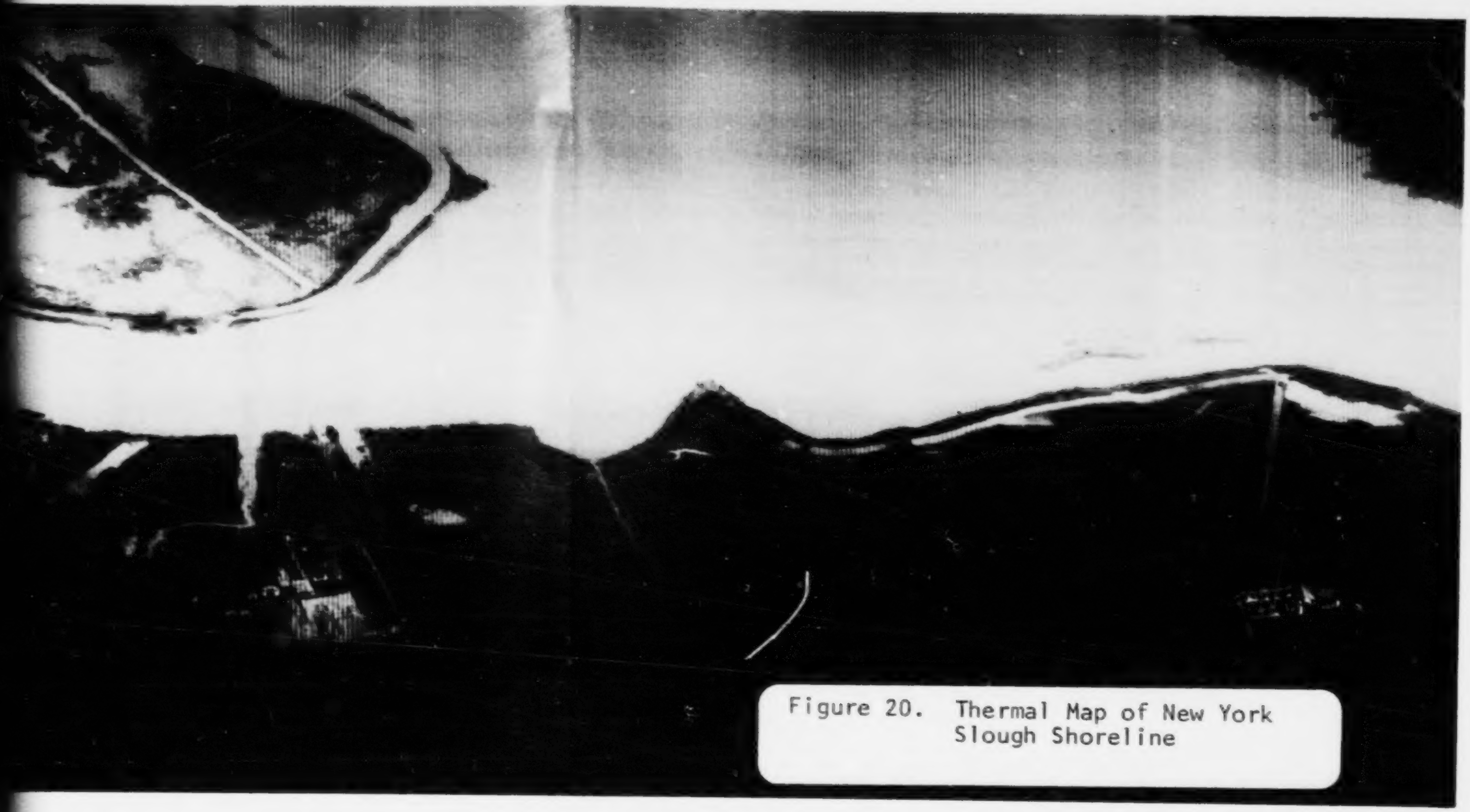


Figure 20. Thermal Map of New York Slough Shoreline

A-48 April - There was a small amount of a yellow-brown outflow from this waterway.

July - Still a small flow but the color was reddish-brown.

A-49 April - The water in this boat repair area was quite turbid.

July - Same indication as April.

A-50 April - There was a yellow-brown outflow from this waterway. The small plume generated was dissipated rapidly in the San Joaquin River.

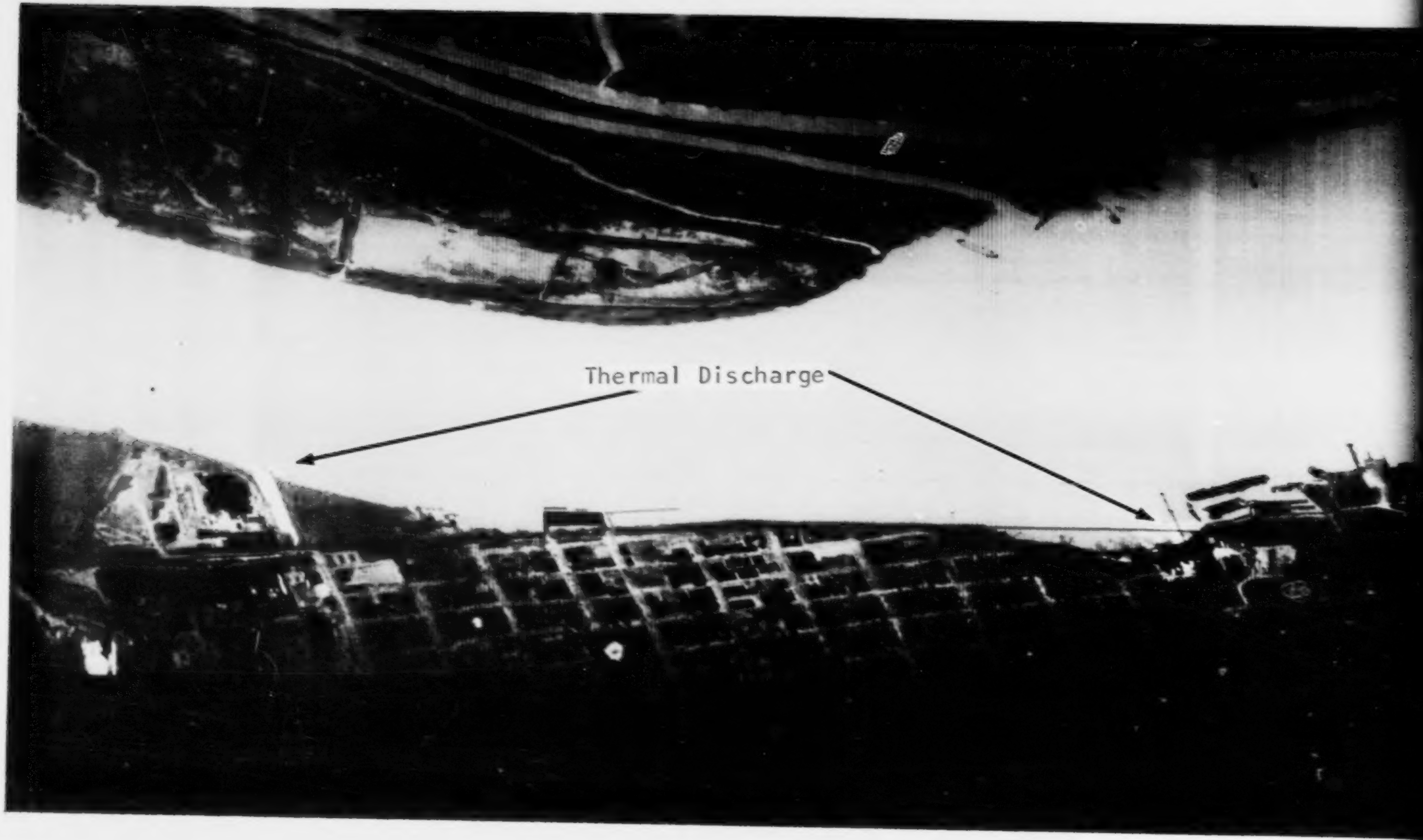
July - There was no outflow.

A-51 April - There was a large volume of a turbid gray-yellow being discharged into the river. A measureable plume was not generated.

July - Thirty meters (100 feet) inland from the bank of the river, an above-surface outfall was discharging a large volume of a reddish-brown wastewater into the waterway.

"July Night" - The waterway imaged as being hot. The water was moving into the river and then in an easterly direction. The plume extended approximately 15 meters (50 feet) out into the river. This is shown in Figure 21.

A-52 "July Night" - A hot discharge was recorded at this location. There was no activity detected in the daytime optical imagery. This is shown in Figure 21.


Thermal Discharge

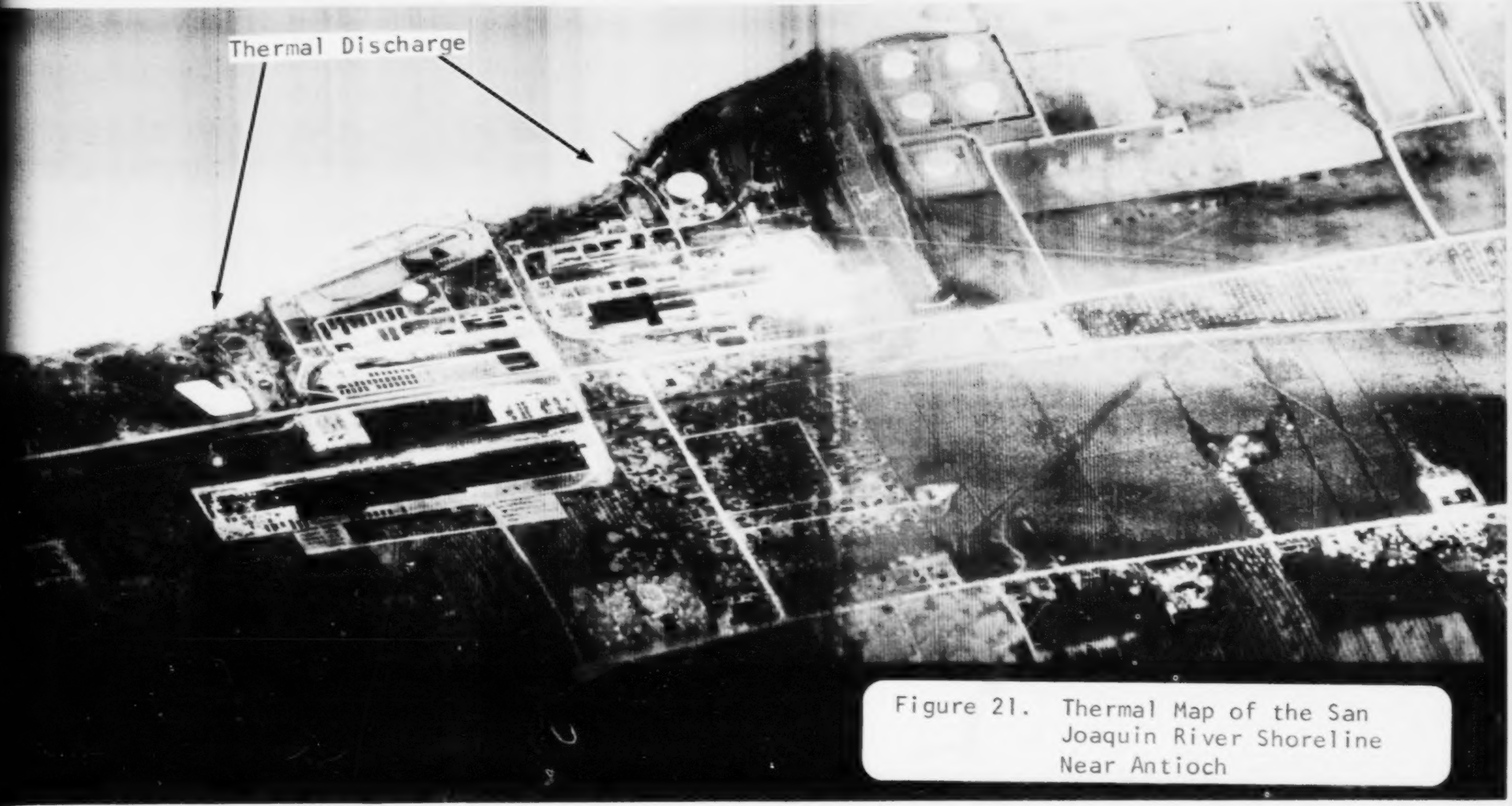

Thermal Discharge

Figure 21. Thermal Map of the San Joaquin River Shoreline Near Antioch

A-53 April - An active subsurface outfall was discharging a reddish-brown substance into the San Joaquin River. An area, measuring 12 by 15 meters, of the river was discolored by this discharge.

July - Same indication as April

"July Night" - There was a warm plume generated from this subsurface outfall, as shown in Figure 21.

A-54 July - The water surface was disturbed indicating the possibility of a subsurface outfall. There was no discoloration associated with this activity. The location of water disturbance was on the east side and at the mid-point of the ramp leading to the dock.

A-55 April - An active outfall was discharging into the river. A small amount of a black colored substance was in the discharge.

July - An active outfall was recorded at this point.

"July Night" - The thermal imagery confirmed the presence of the discharge. The temperature of the effluent was warmer than that of the receiving waters. The discharge location is shown in Figure 21.

A-56 April - An active outfall from the west end of the Contra Costa electric power plant was recorded.

July - Same indication. This discharge is shown in Figure 22.

46-A

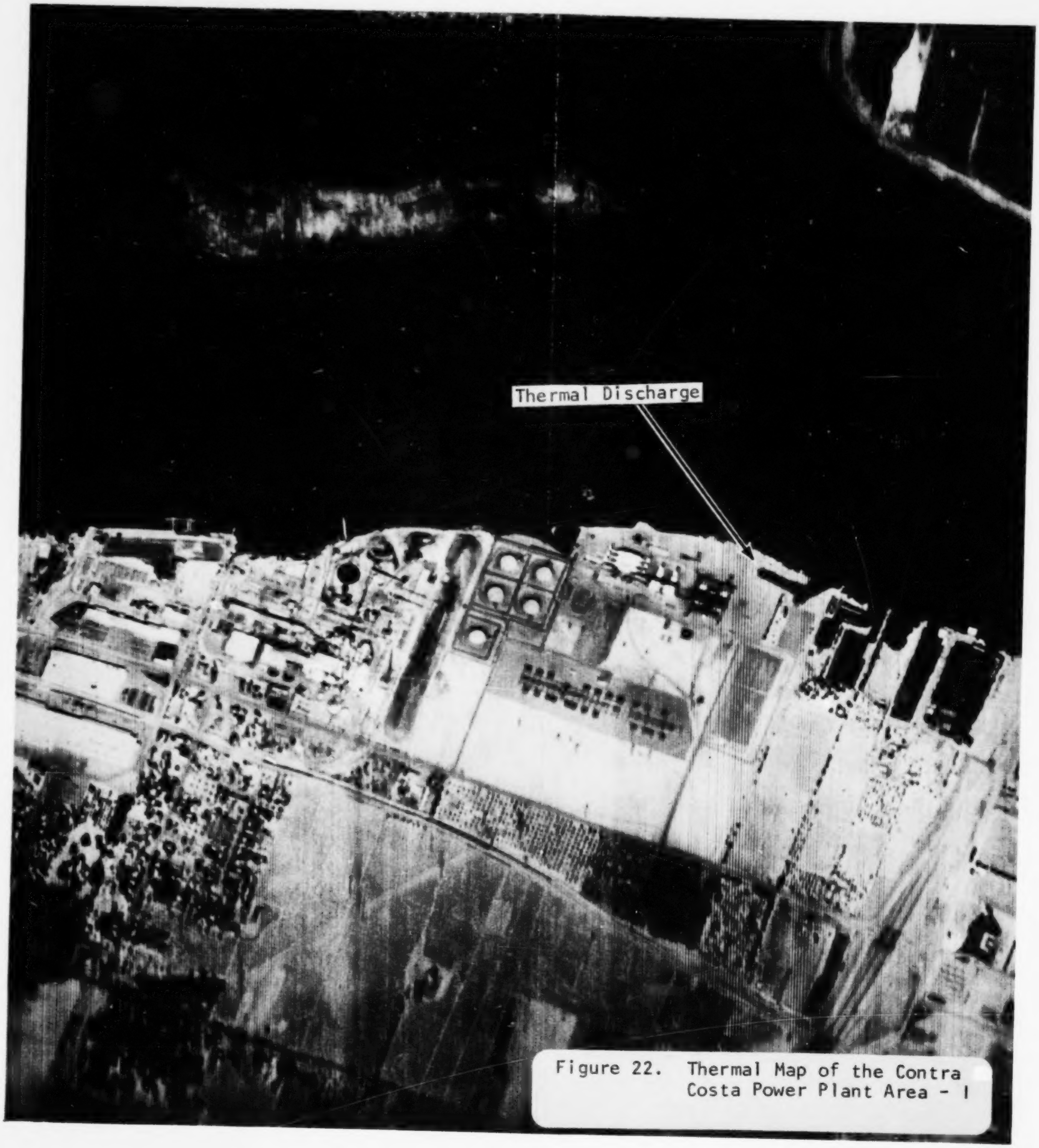

Thermal Discharge

Figure 22. Thermal Map of the Contra Costa Power Plant Area - I

"July Night" - A large hot plume was generated as shown in Figure 23. It extended nearly 275 meters (900 feet) eastward along shore with respect to the discharge point. This is shown in Figure 23.

A-57 April - An active outfall from the eastern end of the Contra Costa electric power plant.

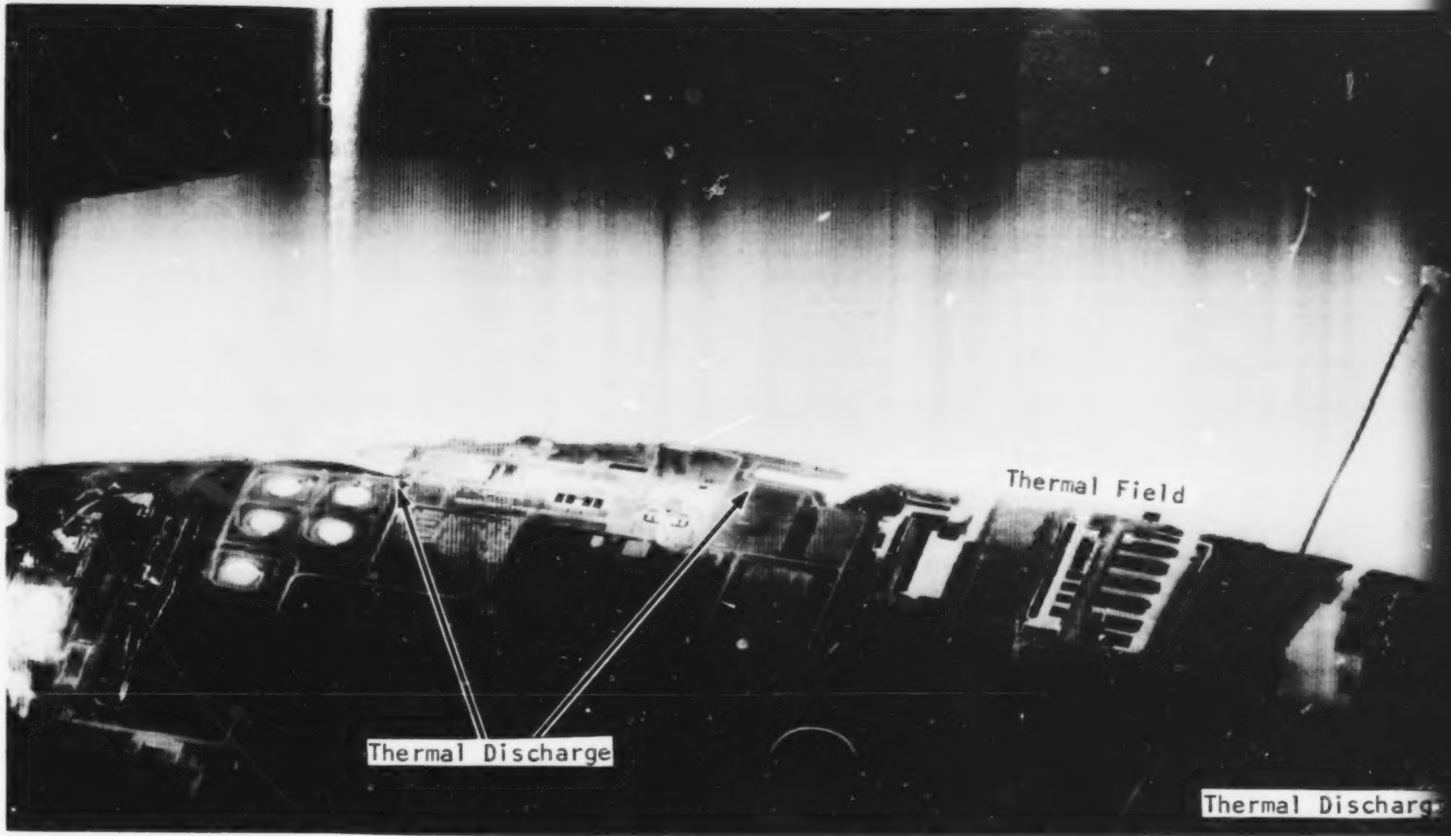
July - Same indication. Plume is shown in Figures 22 and 24. Figure 24 was recorded one day after Figure 22.

"July Night" - A large hot plume was generated, as shown in Figure 23. It extended along the eastern shore for nearly 1,070 meters (3,500 feet).

NOTE: Indication number A-58 appears on Figure 25, the Jersey Island 7.5 minute map.

A-58 July - A discharge conduit leading from three ponds was discharging at this point. There was no visible discoloration.

"July Night" - The thermal imagery, Figure 23, show the three ponds in this area as being warm. A discharge conduit or ditch is easily seen carrying the warm effluent from the western most pond to the river.


Thermal Field
Thermal Discharge
Thermal Discharg

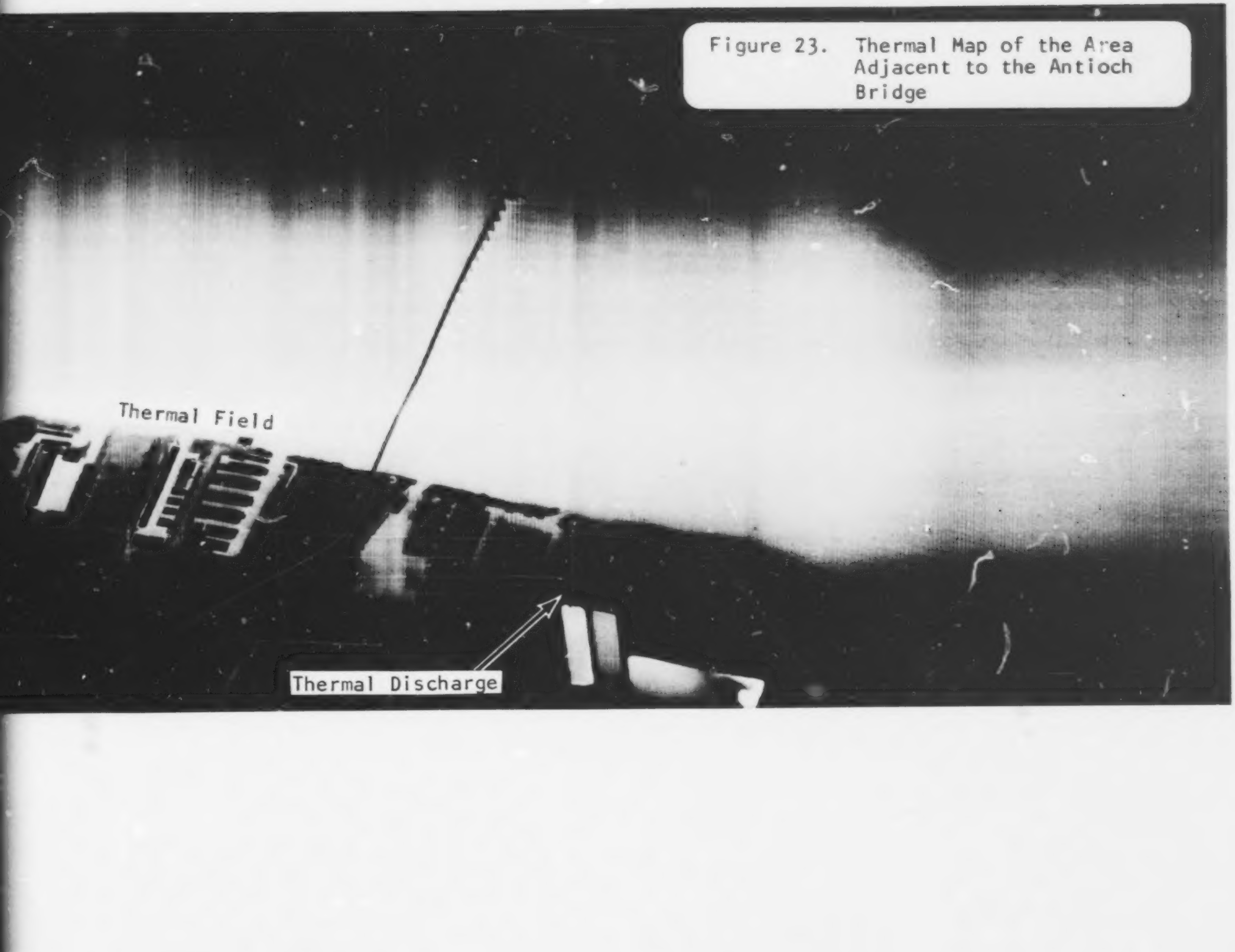


Figure 23. Thermal Map of the Area Adjacent to the Antioch Bridge

Thermal Field
Thermal Discharge

47-b

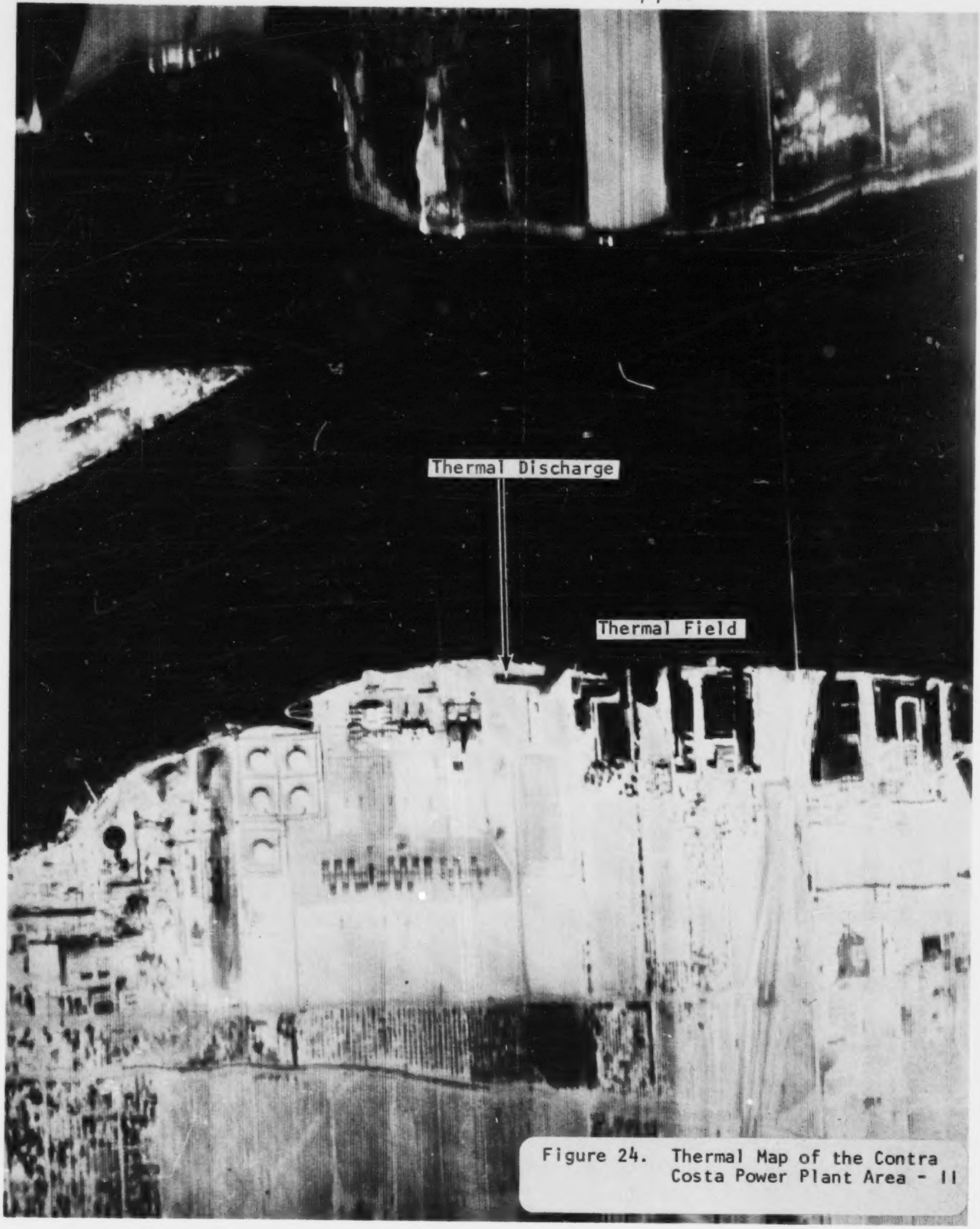
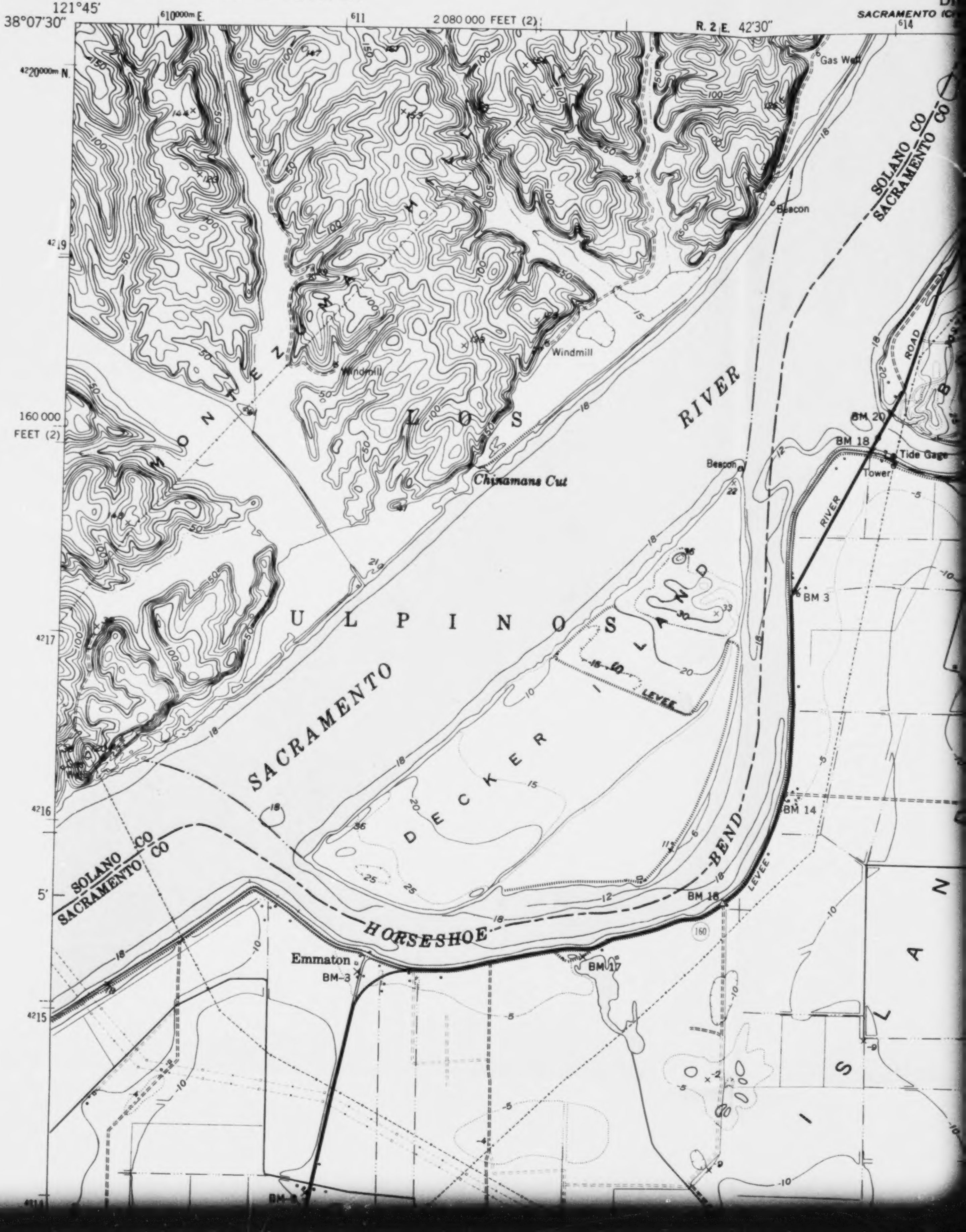

Thermal Discharge
Thermal Field

Figure 24. Thermal Map of the Contra Costa Power Plant Area - II

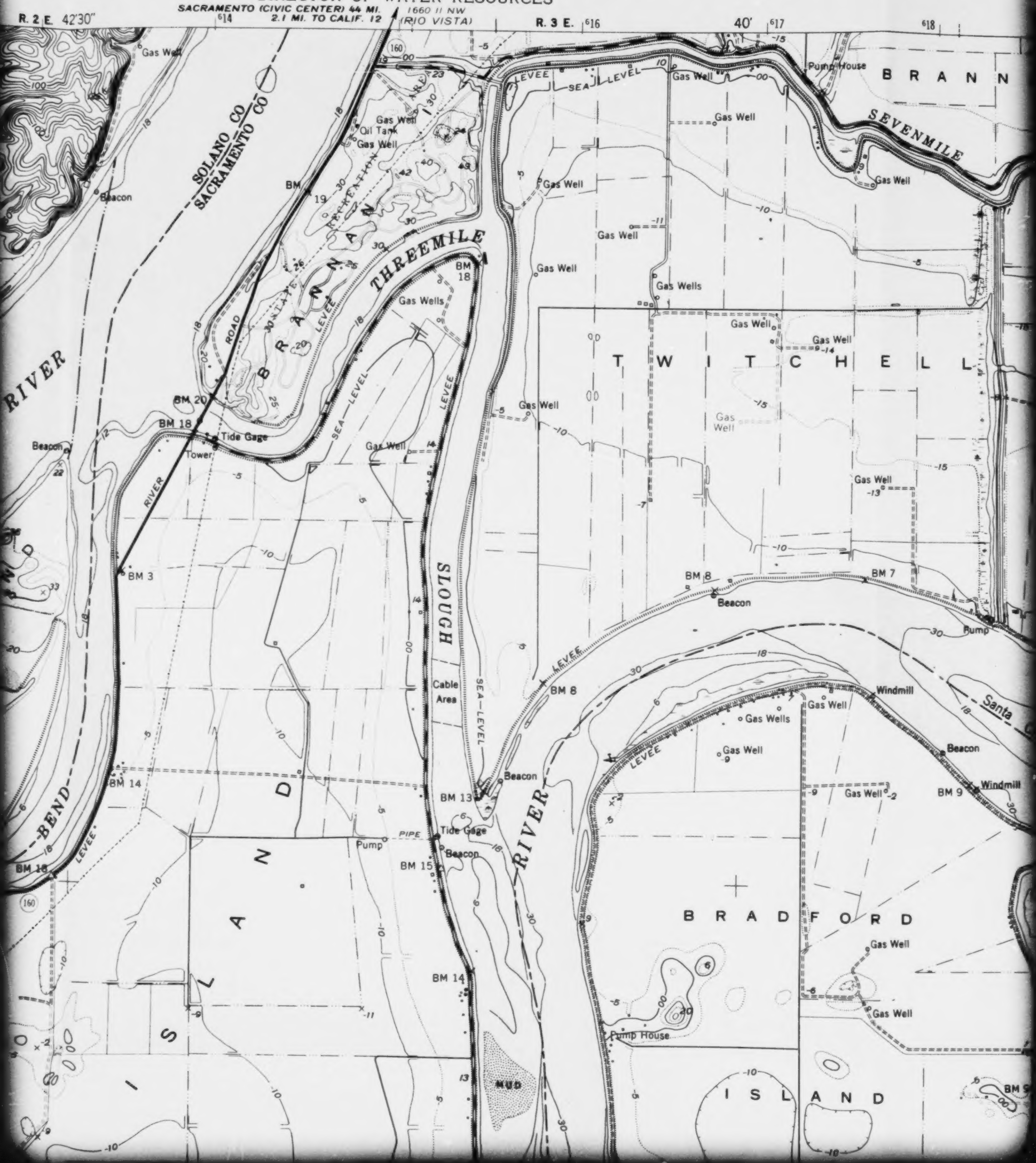
1660 III NE
(BIRDS LANDING)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY


121°45'
38°07'30"
610000m E.
611
2 080 000 FEET (2)
R. 2 E. 42'30"
614
SACRAMENTO (C
DI
4220000m N.
4219
160 000
FEET (2)
4217
4216
5'
4215
4214
MONTEZUMA
LOS
ULPINOS
SACRAMENTO
RIVER
DECKER
ISLAND
HORSESHOE
BEND
Chinamans Cut
Gas Well
Beacon
Windmill
Windmill
Beacon
Tide Gage
Tower
BM 20
BM 18
BM 3
BM 14
BM 18
BM 17
BM-3
BM-3
Emmaton
160
LEVEE
LEVEE
RIVER
ROAD
SOLANO CO
SACRAMENTO CO
SOLANO CO
SACRAMENTO CO
ISLAND
100
50
150
18
15
21
22
30
33
20
10
25
12
-5
-10
-9
-2

47-C

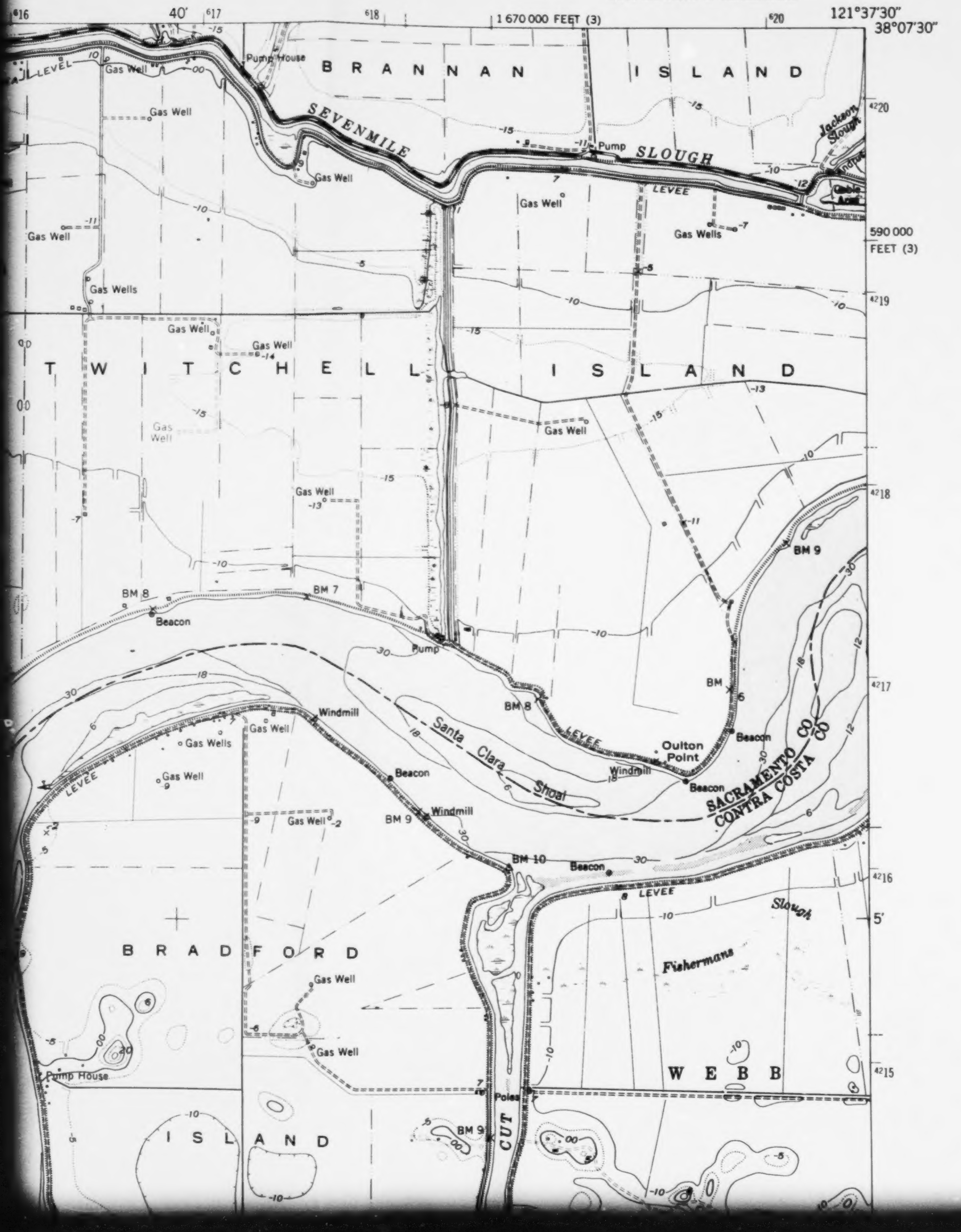
STATE OF CALIFORNIA
DIRECTOR OF WATER RESOURCES


SACRAMENTO (CIVIC CENTER) 44 MI.
2.1 MI. TO CALIF. 12
1660 II NW
(RIO VISTA)
R. 2 E.
42'30"
614
R. 3 E.
616
40'
617
618
SOLANO CO
SACRAMENTO CO
RIVER
BEND
Beacon
Gas Well
Oil Tank
BM 19
BM 20
BM 18
Tide Gage
Tower
BM 3
BM 14
BM 18
160
BRANNAN
STATE RECREATION AREA
ROAD
LEVEE
SEA LEVEL
THREEMILE
SLOUGH
Gas Wells
Cable Area
BM 13
Pump
PIPE
BM 15
MUD
ISLAND
TWITCHELL
SEVENMILE
Pump House
BRANN
BM 8
BM 7
Windmill
Santa
BM 9
BRADFORD
ISLAND
Pump House

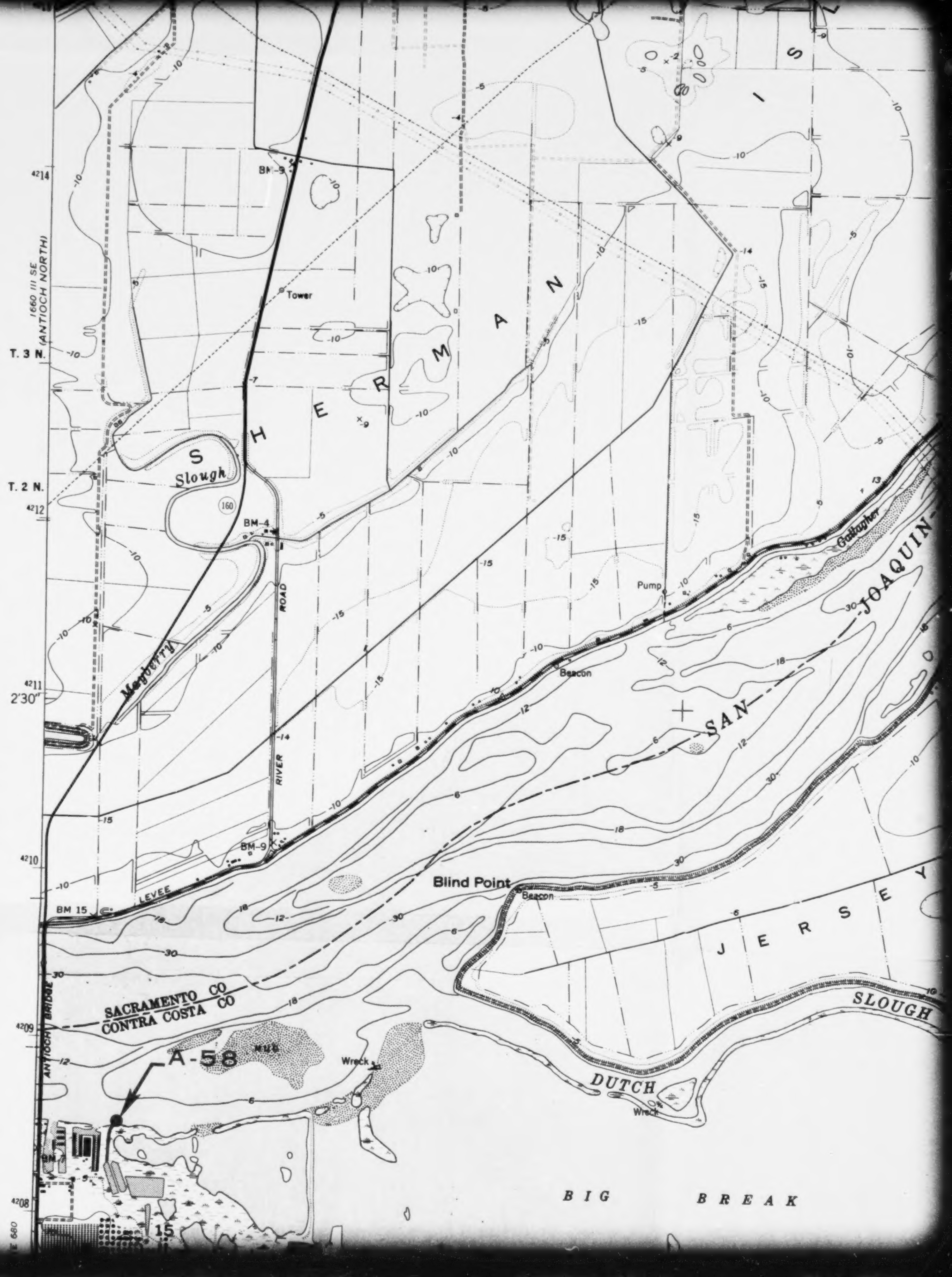
47-C

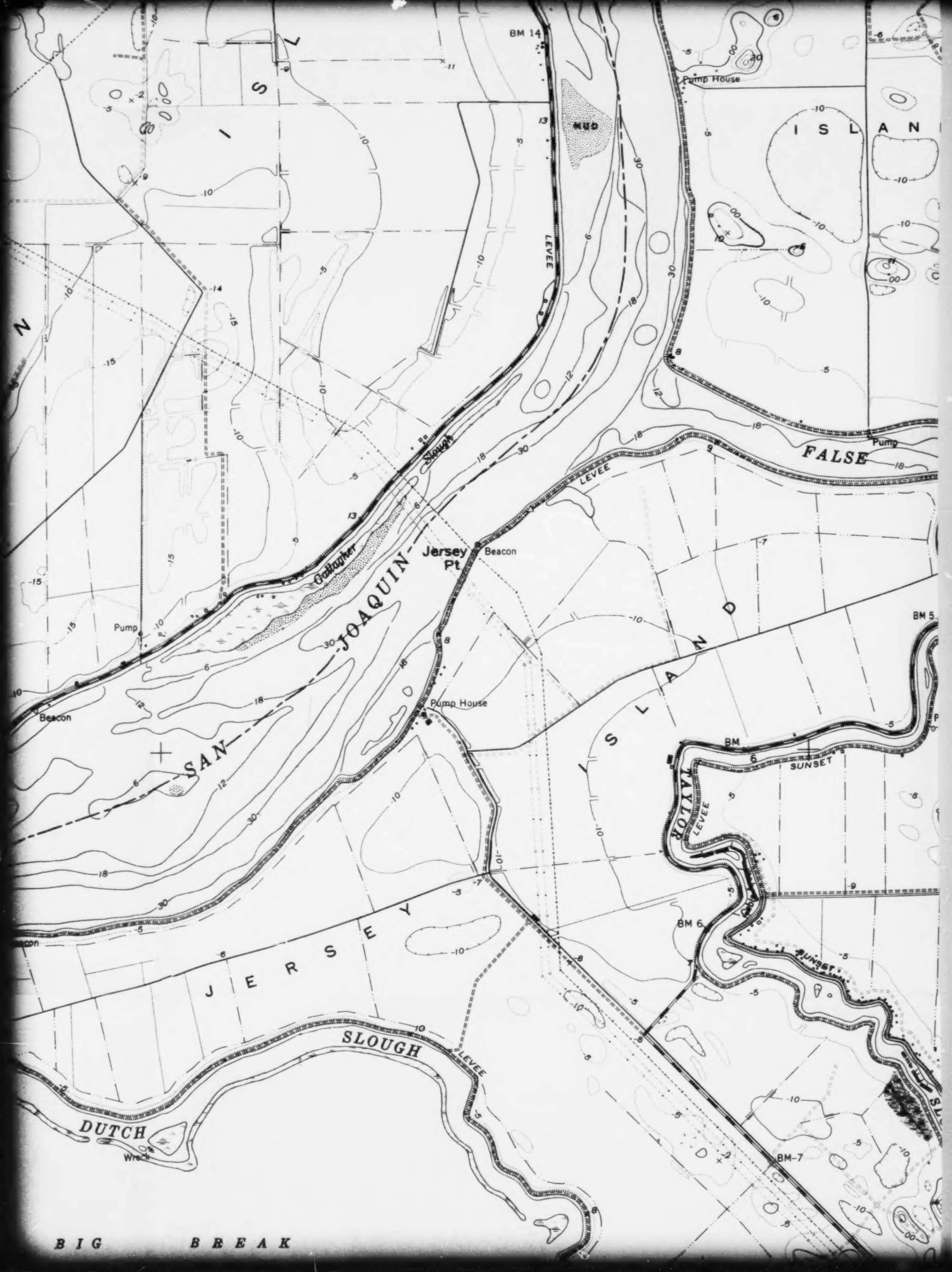
JERSEY ISLAND QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 RIO VISTA 15' QUADRANGLE

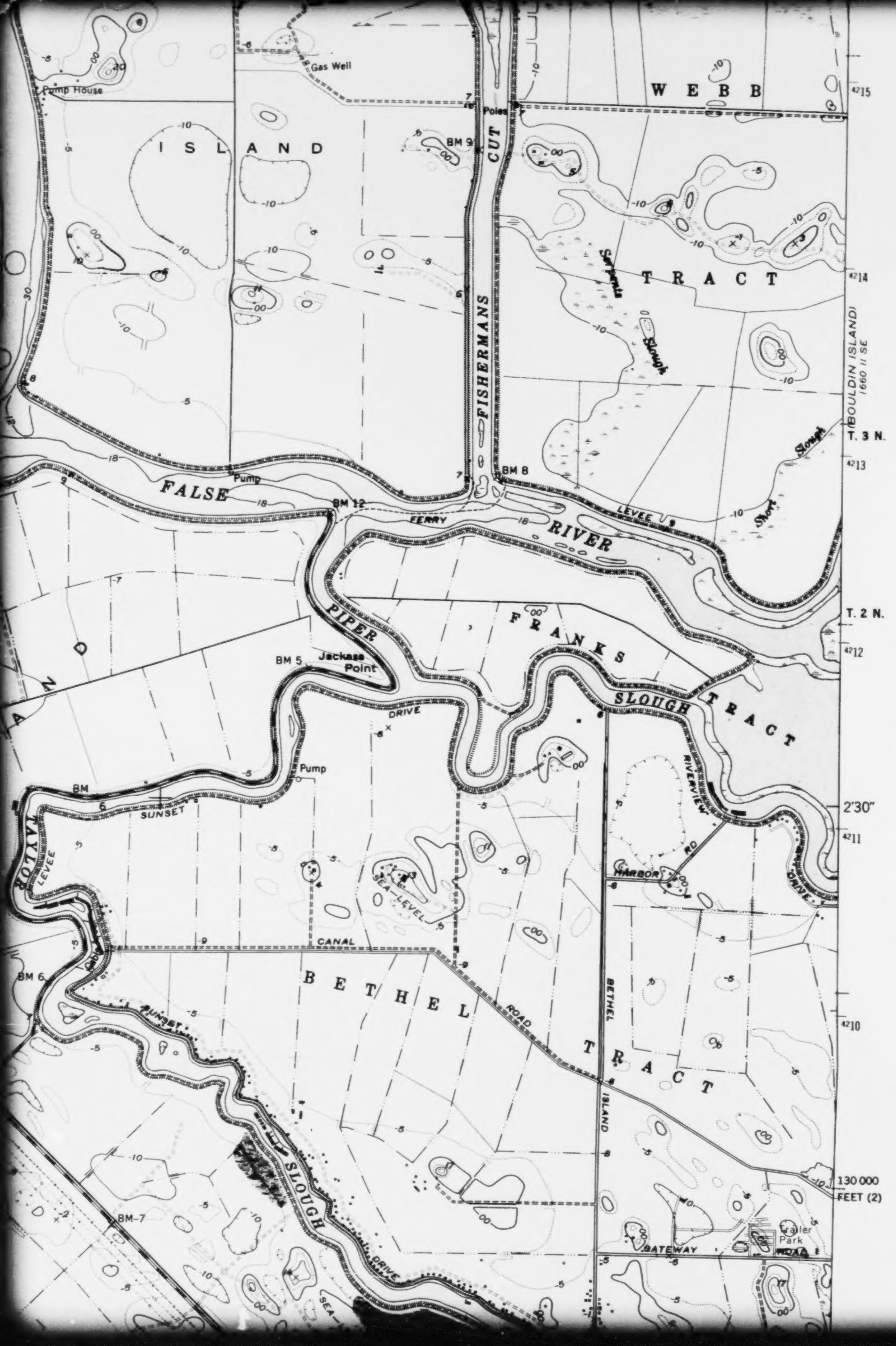
1660 II NE
(ISLETON)

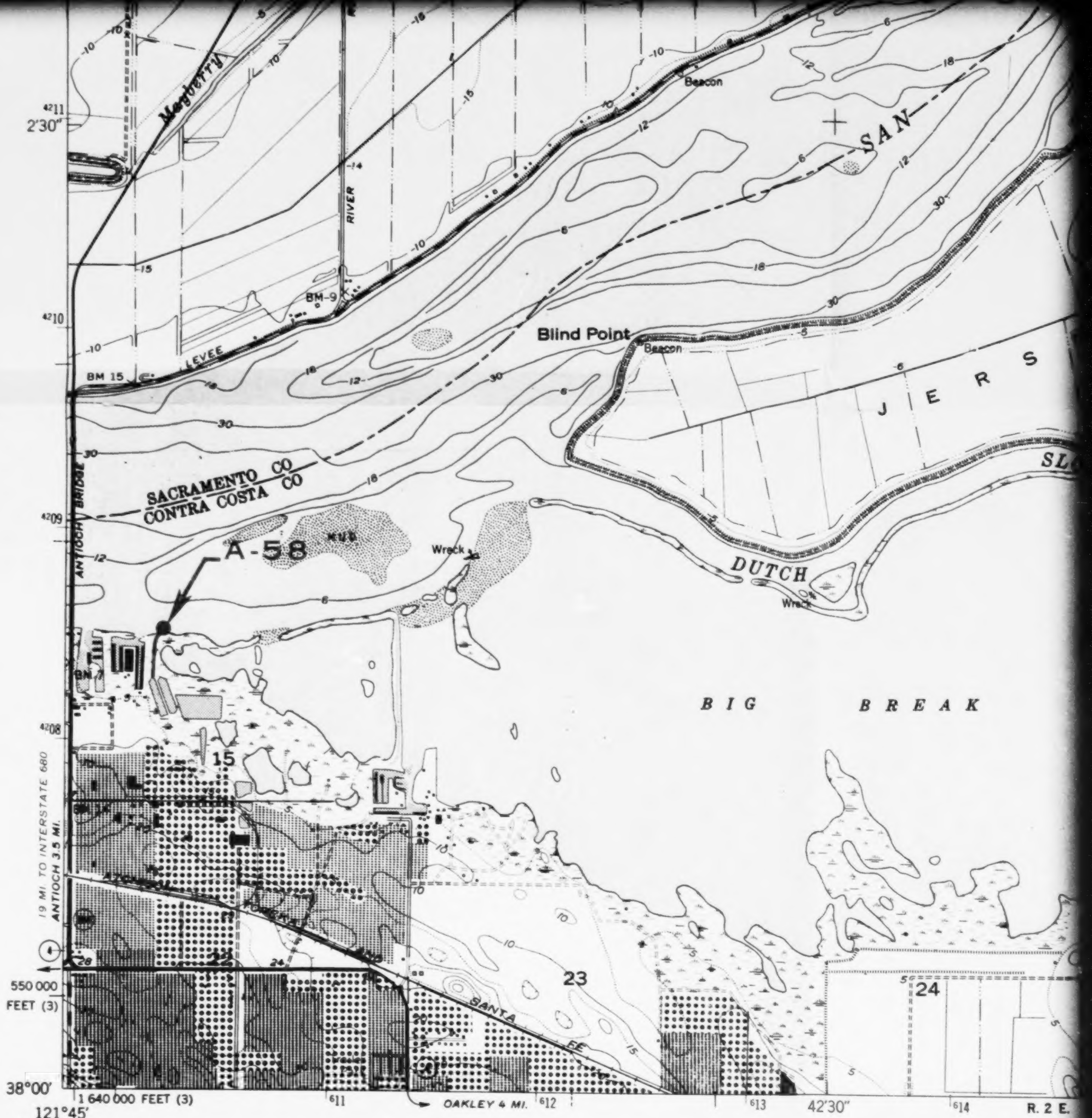


616
40'
617
618
1 670 000 FEET (3)
620
121°37'30"
38°07'30"
4220
590 000
FEET (3)
4219
4218
4217
4216
5'
4215
BRANNAN ISLAND
SEVENMILE SLOUGH
Jackson Slough
Cable Area
Pump House
Pump
LEVEE
Gas Well
Gas Wells
TWITCHELL ISLAND
BM 8
BM 7
Beacon
Pump
BM 9
BM
Windmill
Santa Clara Shoal
Oulton Point
SACRAMENTO CO
CONTRA COSTA CO
BM 10
BRADFORD ISLAND
Fishermans Slough
WEBB
CUT
Poles
Pump House


S H E R M A N
I S L
Slough
Mayberry
Tower
BM-9
BM-4
BM-9
BM 15
BM 7
160
RIVER
ROAD
LEVEE
Pump
Beacon
Gallagher
SAN JOAQUIN
Blind Point
Beacon
J E R S E Y
DUTCH
SLOUGH
Wreck
Wreck
BIG BREAK
A-58
SACRAMENTO CO
CONTRA COSTA CO
ANTIOCH BRIDGE
1660 III SE (ANTIOCH NORTH)
T. 3 N.
T. 2 N.
4214
4212
4211
2'30"
4210
4209
4208
15


BM 14
MUD
LEVEE
Pump House
I S L A N
Slough
Gallagher
FALSE
Pump
LEVEE
Jersey
Pt
Beacon
SAN
JOAQUIN
Pump
Beacon
Pump House
I S L A N D
BM 5
BM
SUNSET
TAYLOR
LEVEE
BM 6
SUNSET
J E R S E Y
SLOUGH
LEVEE
DUTCH
Wreck
BM-7
BIG
BREAK
N
I S L


Pump House
Gas Well
WEBB
ISLAND
BM 9
Poles
FISHERMANS CUT
TRACT
Serpentine Slough
(BOULDIN ISLAND) 1660 II SE
T. 3 N.
Short Slough
BM 8
FALSE
Pump
BM 12
FERRY
RIVER
LEVEE
PIPER
FRANKS
SLOUGH
TRACT
T. 2 N.
BM 5
Jackass Point
D
N
A
DRIVE
Pump
RIVERVIEW
DRIVE
BM
SUNSET
TAYLOR
LEVEE
SEA-LEVEL
HARBOR
RD
2'30"
CANAL
BM 6
BETHEL
ROAD
BETHEL
ISLAND
TRACT
SUNSET
SLOUGH
BM-7
DRIVE
SEA-
GATEWAY
ROAD
Trailer Park
130 000 FEET (2)
4215
4214
4213
4212
4211
4210


Mayberry
River
Levee
BM-9
BM 15
Beacon
SAN
Blind Point
Beacon
J E R S
SL
SACRAMENTO CO
CONTRA COSTA CO
ANTIOCH BRIDGE
A-58
Wreck
DUTCH
Wreck
BIG BREAK
15
23
24
Santa Fe
4211
2'30"
4210
4209
4208
19 MI. TO INTERSTATE 680
ANTIOCH 3.5 MI.
550 000 FEET (3)
38°00'
121°45'
1 640 000 FEET (3)
611
OAKLEY 4 MI.
612
613
42'30"
614
R. 2 E.

(ANTIOCH SOUTH)
1659 IV NE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Culture and drainage by USC&GS from aerial photographs taken 1931
Topography by Kelsh plotter methods from aerial photographs taken 1949 and by plane-table surveys 1952

Hydrography compiled from USC&GS Chart 5527

Polyconic projection. 1927 North American datum
10,000-foot grids based on California coordinate system, zones 2 and 3

Los Ulpinos land grant boundary not shown where coincident with river bank

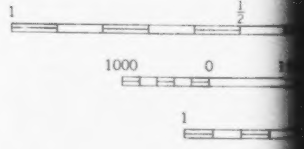
The position of township and range numbers in unsectionized areas are approximate

1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

Revisions shown in purple compiled from aerial photographs taken 1968. This information not field checked

GN
MN
0°48'
14 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



DOTTE
CONTOUR

DEPTH CU
SHORELINE SH
TH

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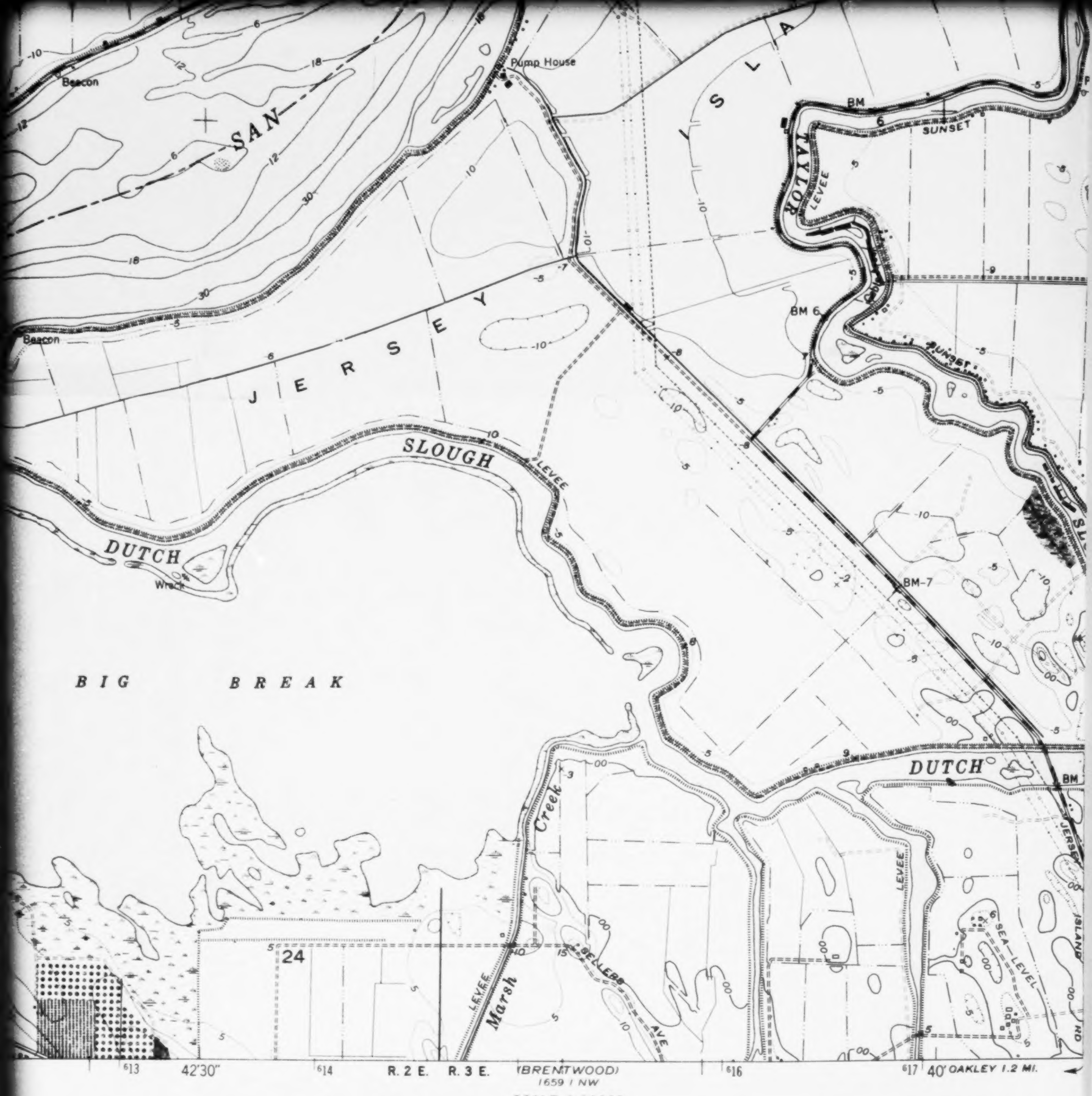
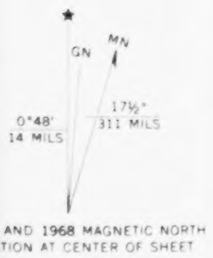
FOR SALE BY U. S. GEOLOGICAL
A FOLDER DESCRIBING T

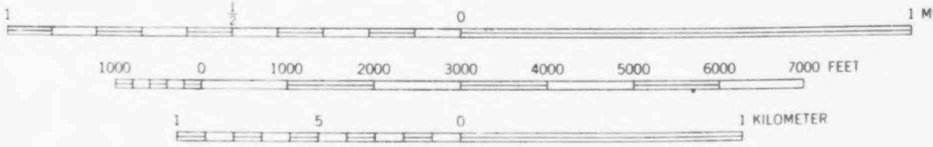


SAN
JERSEY
ISLA
Pump House
Beacon
Beacon
TAYLOR
SLOUGH
LEVEE
SUNSET
BM 6
BM-7
DUTCH
DUTCH
SLOUGH
Wreck
BIG BREAK
Marsh Creek
LEVEE
SELLERS AVE
24
SEA LEVEL
ISLAND RD
JERSEY
BM
613
42'30"
614
R. 2 E.
R. 3 E.
(BRENTWOOD)
1659 I NW
616
617
40'
OAKLEY 1.2 MI.

SCALE 1:24000



GN
MN
0°48'
14 MILS
17½°
311 MILS



1
½
0
1 MILE
1000
0
1000
2000
3000
4000
5000
6000
7000 FEET
1
.5
0
1 KILOMETER

RID AND 1968 MAGNETIC NORTH
LINATION AT CENTER OF SHEET

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS
CONTOURS INCOMPLETE ALONG EMBANKMENTS AND DITCHES
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE AVERAGE RANGE OF TIDE IS APPROXIMATELY 3 FEET

QUADRA

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

d from aerial photographs
field checked

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

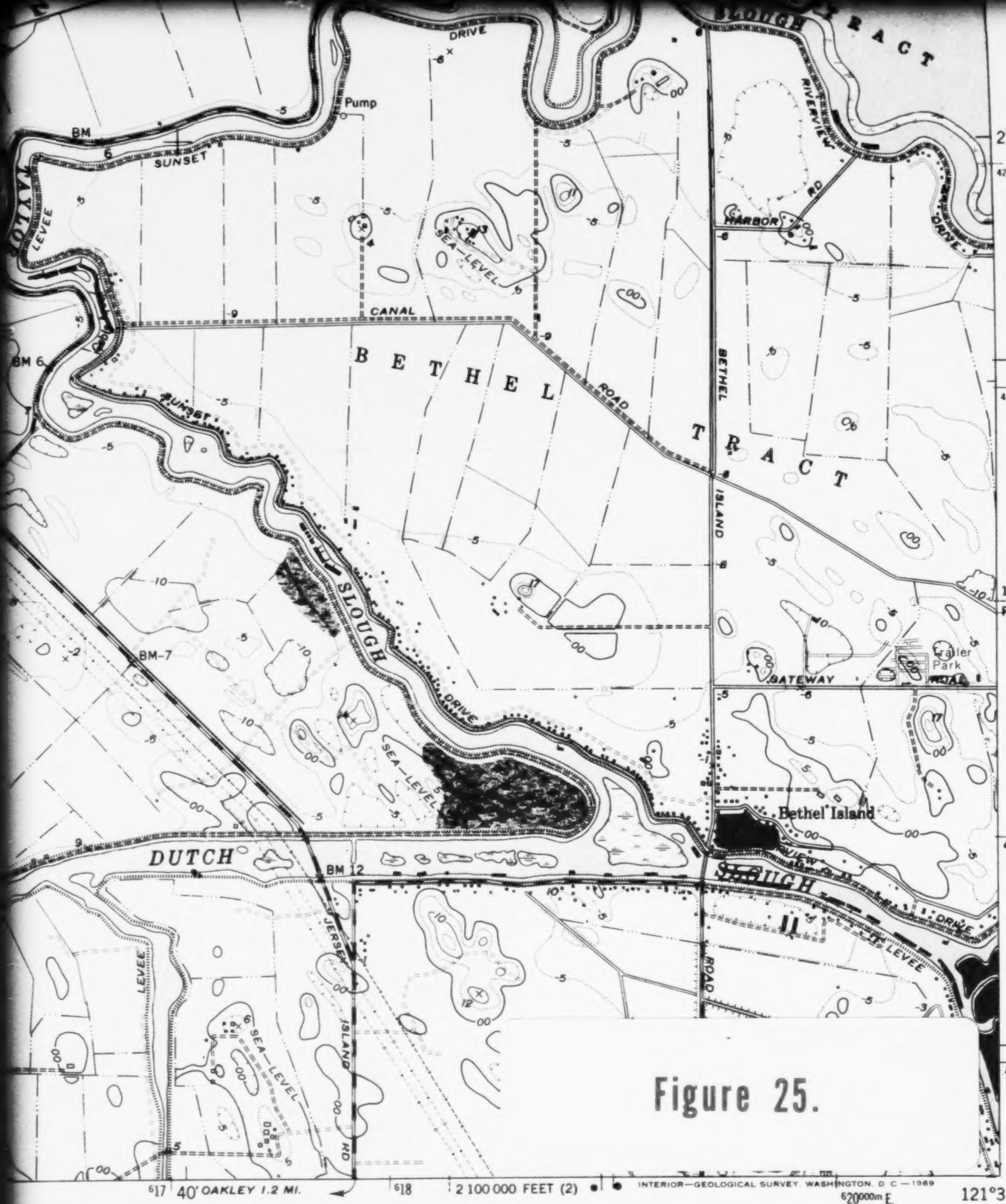

SLOUGH
TRACT
DRIVE
Pump
BM
SUNSET
LEVEE
SEA-LEVEL
CANAL
RIVERVIEW
HARBOR
RD
2'30"
4211
4210
BETHEL
TRACT
ROAD
BETHEL
ISLAND
BM 6
SUNSET
SLOUGH
DRIVE
BM-7
SEA-LEVEL
130 000 FEET (2)
Trailer Park
GATEWAY
ROAD
Bethel Island
4208
DUTCH
BM 12
SLOUGH
DRIVE
LEVEE
JERSEY
ISLAND
RD
ROAD
SEA-LEVEL
LEVEE
4207000m N.
617
40' OAKLEY 1.2 MI.
618
2 100 000 FEET (2)
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1969
620000m E.
38°00'
121°37'30"
(WOODWARD ISLAND)
1659 I NE

Figure 25.

1 MILE
7000 FEET
ILOMETER

ROAD CLASSIFICATION

Heavy-duty ▬ Light-duty ═
Medium-duty ▬ Unimproved dirt ┅
○ State Route

QUADRANGLE LOCATION

JERSEY ISLAND, CALIF.
SW/4 RIO VISTA 15' QUADRANGLE
N3800—W12137.5/7.5

1952
PHOTOREVISED 1968
AMS 1660 II SW—SERIES V895

HINGTON, D. C. 20242
N REQUEST

San Francisco Bay Area - Section B

Section B extends from Pinole Point southward along the eastern shores of San Pablo Bay and San Francisco Bay to a point approximately 0.8 kilometers (0.5 miles) south of the San Francisco-Oakland Bay Bridge. This is shown in Figure 1 and Figure 26.

NOTE: Indication number B-1 appears on Figure 27, the Richmond map.

B-1 April - No discernable indication recorded.

July - A small volume of greenish water was flowing through a ditch into San Pablo Bay from an industrial area in Rheem. The ditch contained large surface mats of algae in its lower reaches.

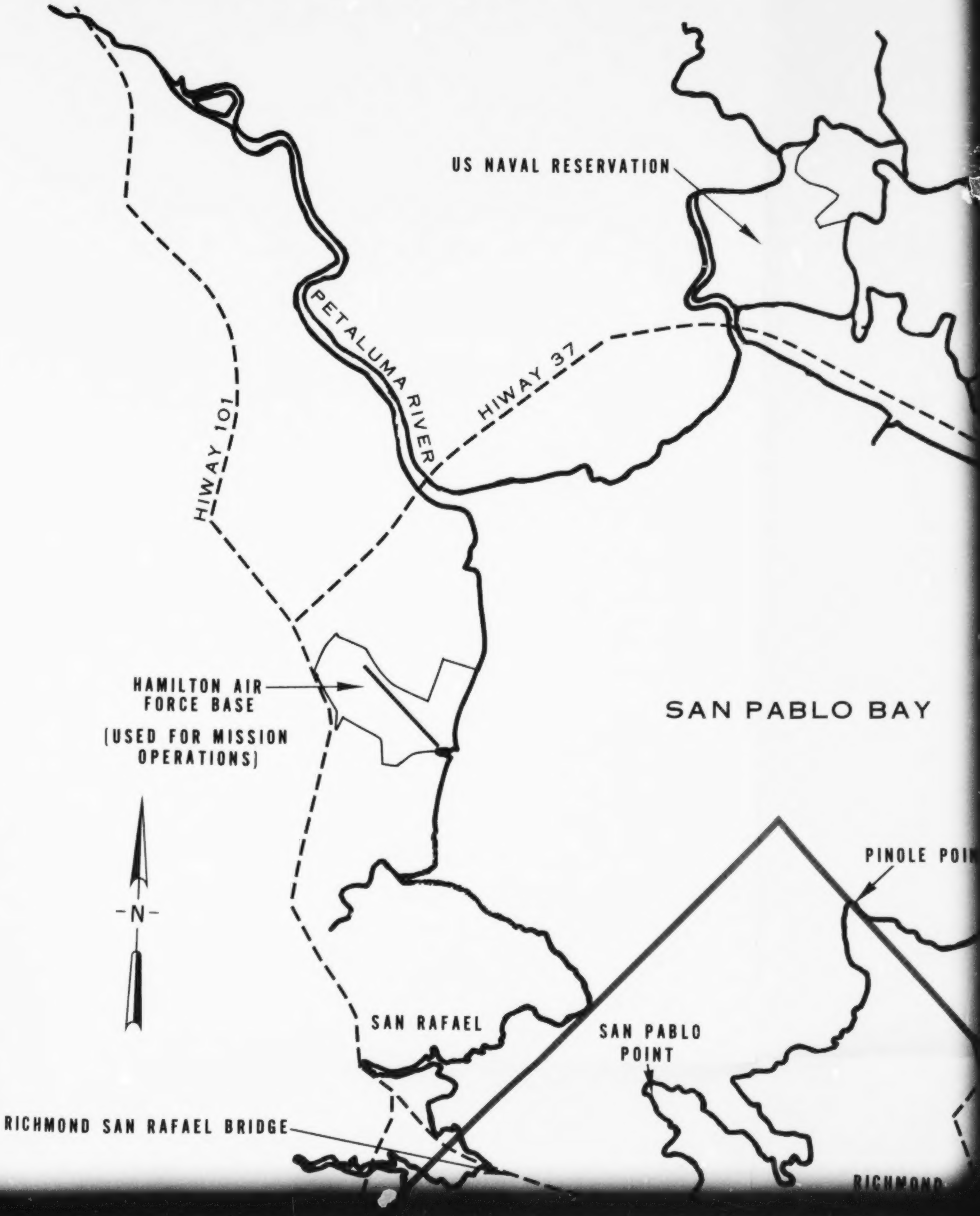
NOTE: Indication numbers B-2 through B-8 appear on Figure 28, the San Quentin map.

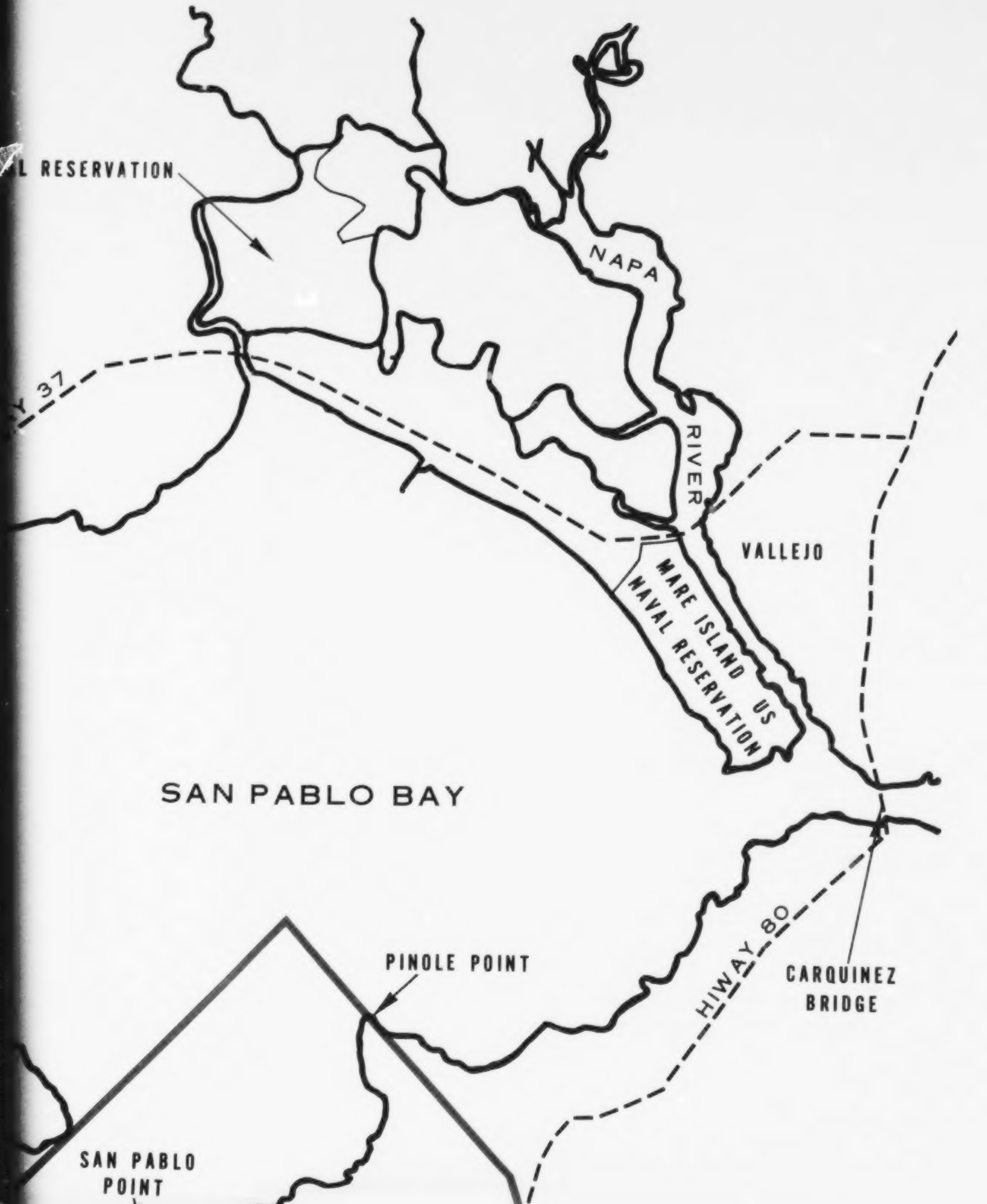
B-2 April - The water flowing into San Pablo Bay from San Pablo Creek was grayish brown in color.

July - No discoloration was recorded. The temperature of the Creek waters was somewhat cooler than the Bay waters.

B-3 April - Moderate volume discharge through the ditch from San Pablo S.D. Sewage Treatment Plant. No discoloration of Bay waters by the effluent was recorded. The effluent was not septic at time of flight.

July - Effluent characteristics unchanged.


US NAVAL RESERVATION
PETALUMA RIVER
HIWAY 37
HIWAY 101
HAMILTON AIR FORCE BASE
(USED FOR MISSION OPERATIONS)
SAN PABLO BAY
N
PINOLE POI
SAN RAFAEL
SAN PABLO POINT
RICHMOND SAN RAFAEL BRIDGE
RICHMOND


L RESERVATION
NAPA
RIVER
Y 37
VALLEJO
MARE ISLAND US
NAVAL RESERVATION
SAN PABLO BAY
HIWAY 80
CARQUINEZ
BRIDGE
PINOLE POINT
SAN PABLO
POINT
1 ½ 0 1 2

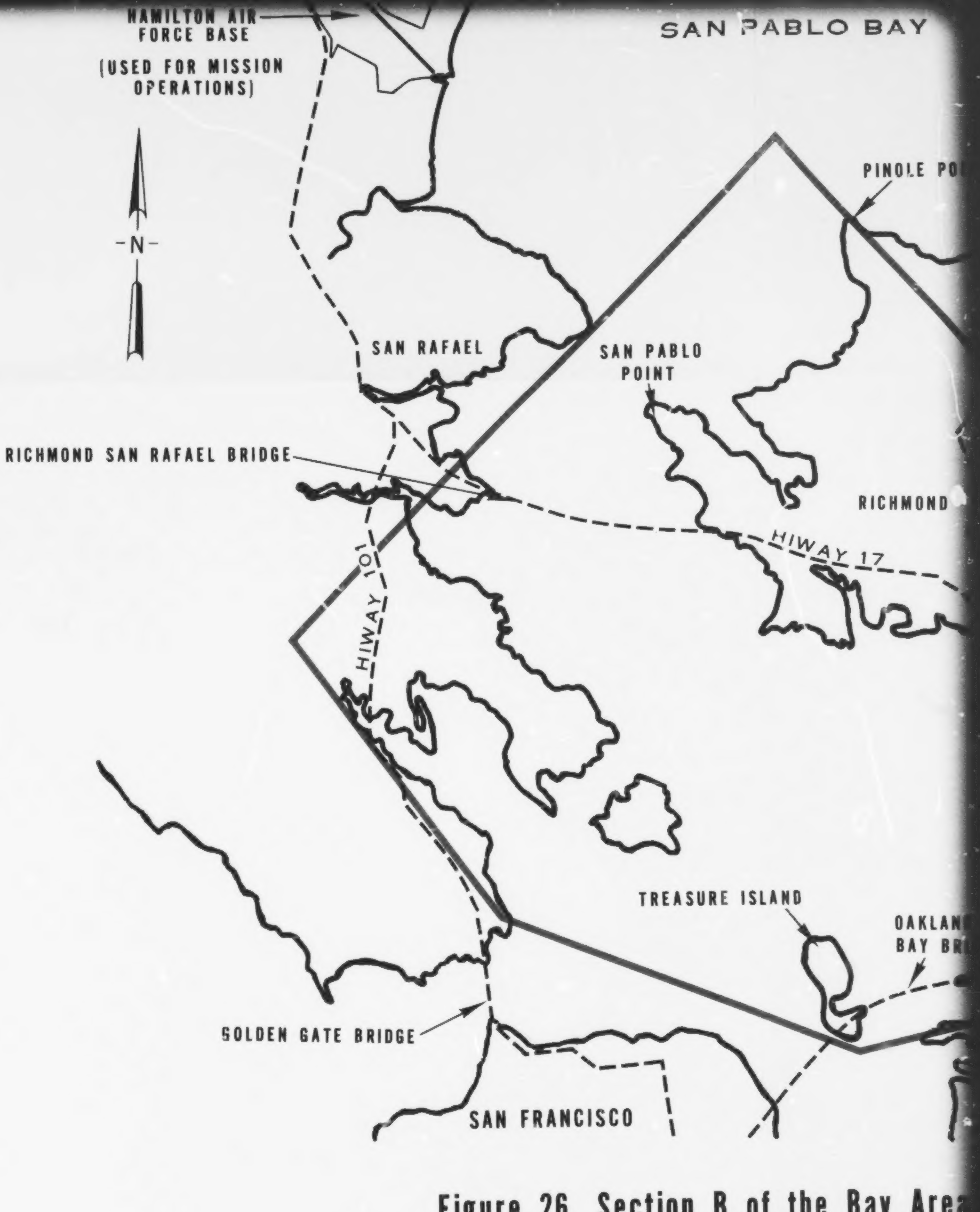
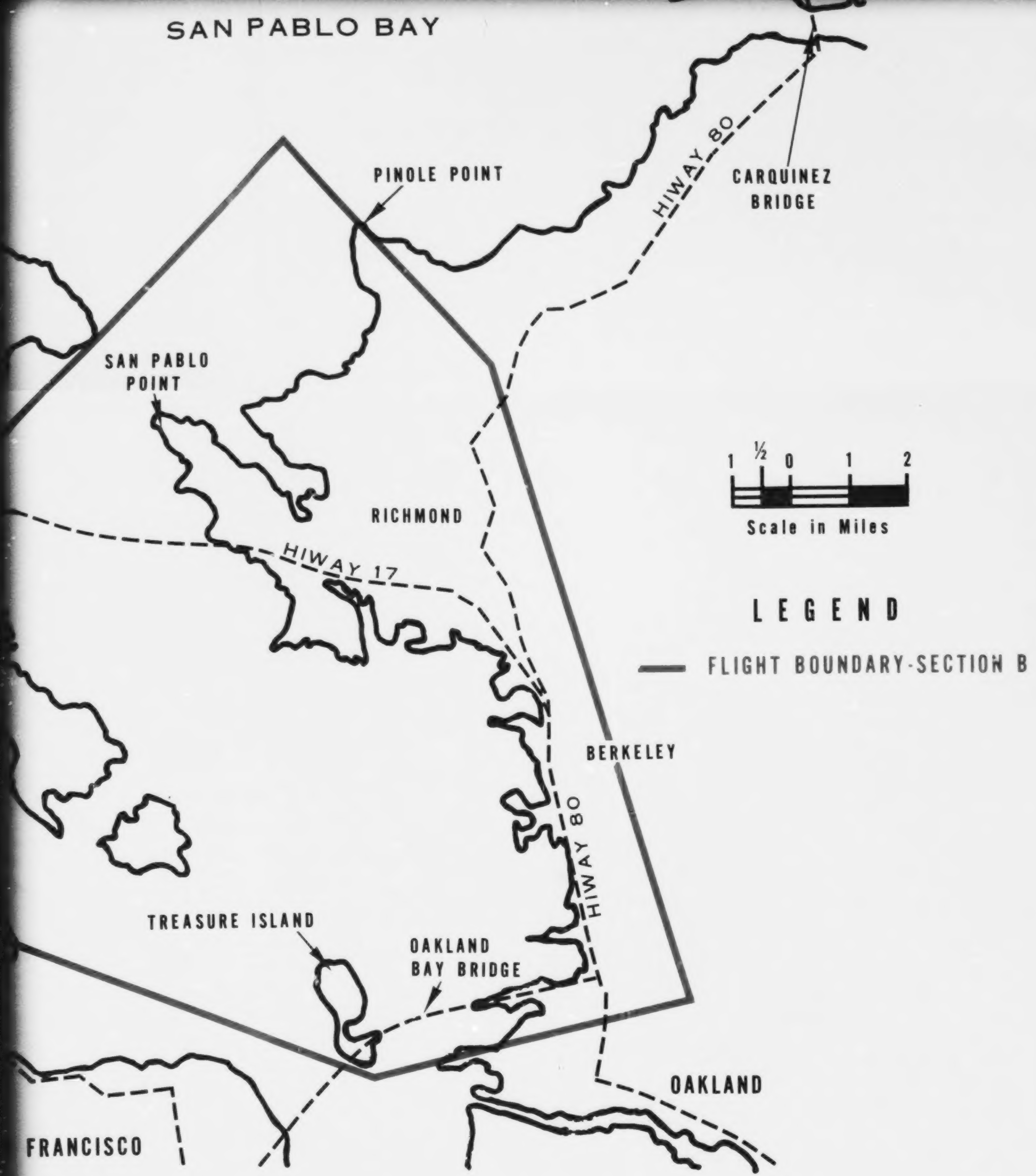
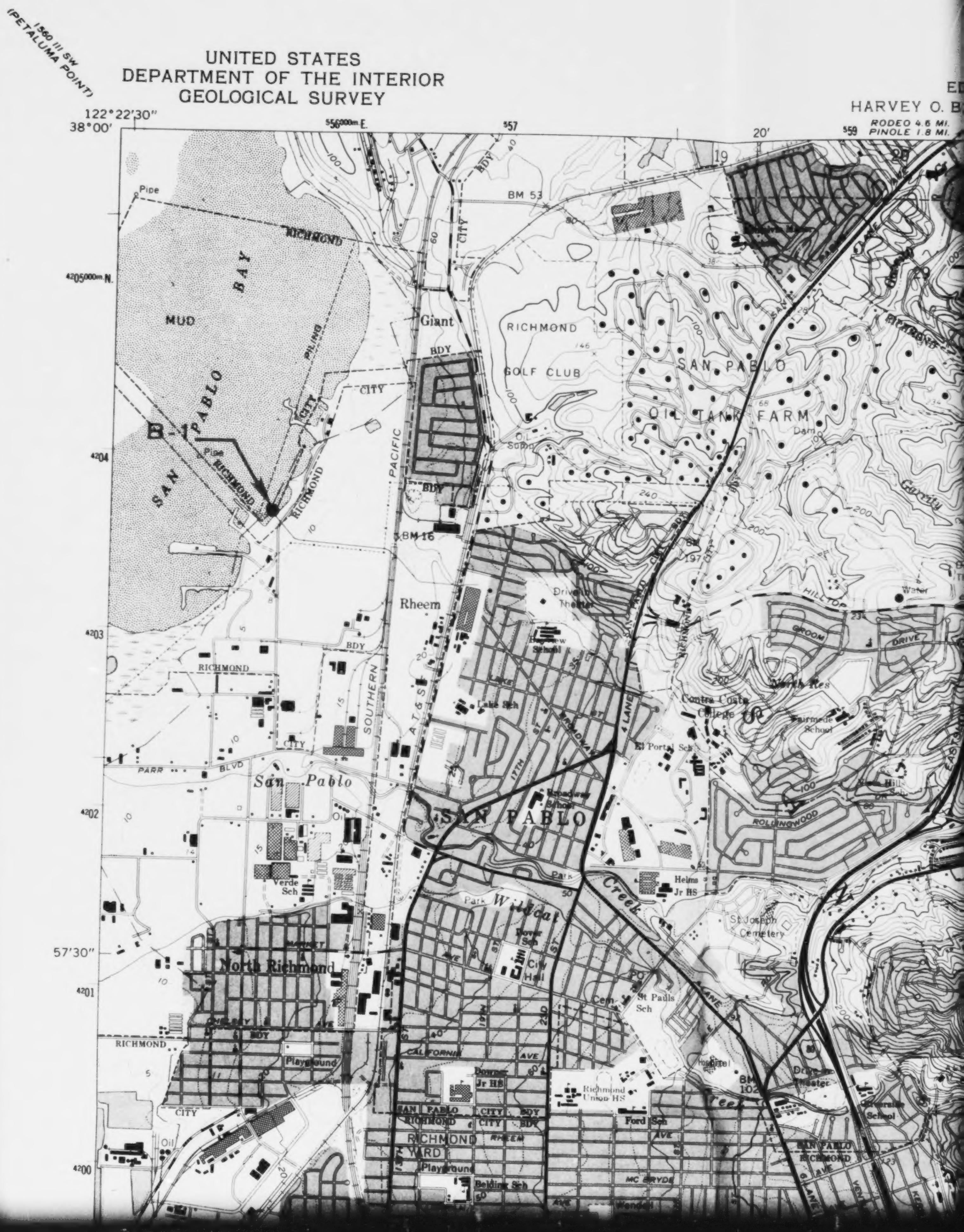

HAMILTON AIR FORCE BASE
(USED FOR MISSION OPERATIONS)
SAN PABLO BAY
PINOLE PO
N
SAN RAFAEL
SAN PABLO POINT
RICHMOND SAN RAFAEL BRIDGE
RICHMOND
HIWAY 17
HIWAY 101
TREASURE ISLAND
OAKLAN
BAY BR
GOLDEN GATE BRIDGE
SAN FRANCISCO

Figure 26. Section B of the Bay Area

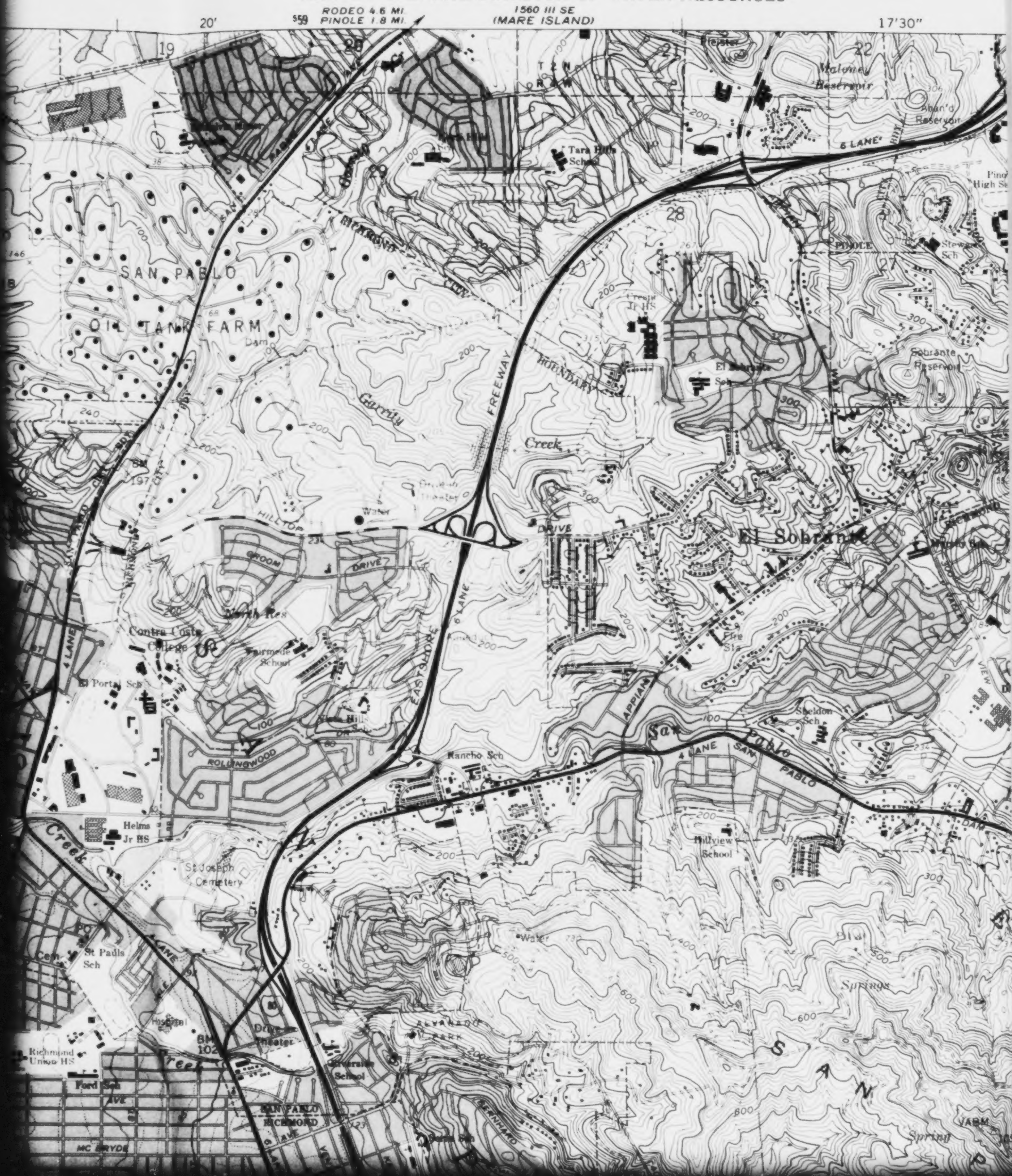

SAN PABLO BAY
PINOLE POINT
CARQUINEZ BRIDGE
HIWAY 80
SAN PABLO POINT
RICHMOND
HIWAY 17
1 ½ 0 1 2
Scale in Miles
LEGEND
FLIGHT BOUNDARY-SECTION B
BERKELEY
HIWAY 80
TREASURE ISLAND
OAKLAND BAY BRIDGE
OAKLAND
FRANCISCO

e 26. Section B of the Bay Area

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY


1560 III SW (PETALUMA POINT)
ED
HARVEY O. B
122°22'30"
38°00'
556000m.E.
557
20'
559
RODEO 4.6 MI.
PINOLE 1.8 MI.
4205000m.N.
4204
4203
4202
57'30"
4201
4200
Pipe
RICHMOND
BAY
MUD
SAN PABLO BAY
B-1
PILING
CITY
BDY
BM 53
Giant
RICHMOND
GOLF CLUB
SAN PABLO
OIL TANK FARM
Dam
Garrity
Sump
BM 16
Rheem
SOUTHERN PACIFIC
AT & SF
Drive-in Theater
Hillview School
Lake Sch
HILLTOP
GROOM
DRIVE
North Res
Contra Costa College
Fairmede School
El Portal Sch
PARR BLVD
San Pablo
SAN PABLO
Broadway School
ROLLINGWOOD
Verde Sch
Oil
Park
Wildcat Creek
Helms Jr HS
St Joseph Cemetery
Dover Sch
City Hall
North Richmond
MARKET
AVE
PO
Cem
St Pauls Sch
CHESLEY AVE
Playground
CALIFORNIA AVE
Downer Jr HS
Richmond Union HS
Hospital
BM 102
Drive-in Theater
Riverside School
CITY
SAN PABLO
RICHMOND
CITY BDY
RICHMOND
RHEEM
YARD
Ford Sch
Playground
Belding Sch
MC BRYDE
Wendell
SAN PABLO
RICHMOND
19
28
29

STATE OF CALIFORNIA
EDMUND G. BROWN, GOVERNOR
HARVEY O. BANKS. DIRECTOR OF WATER RESOURCES

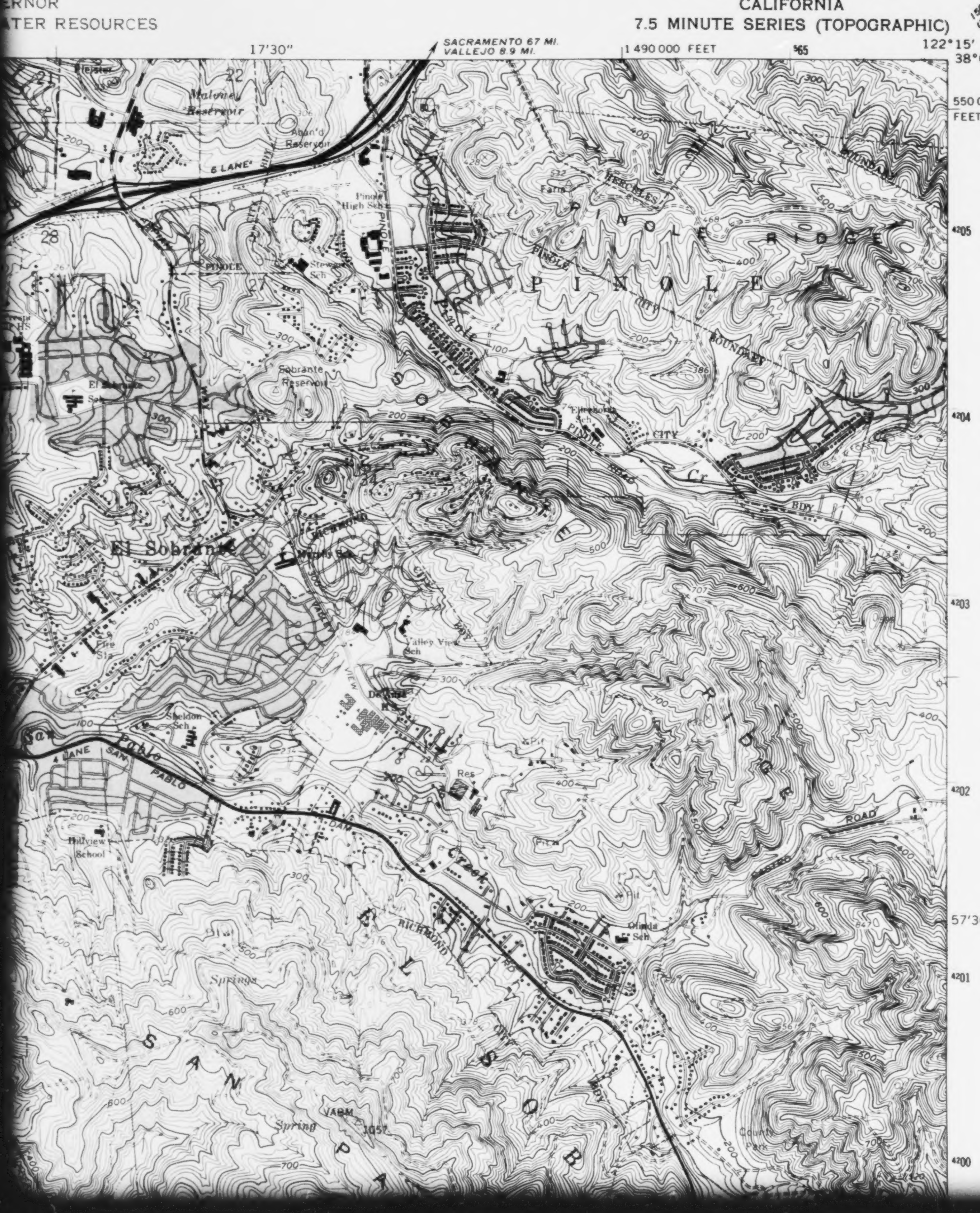


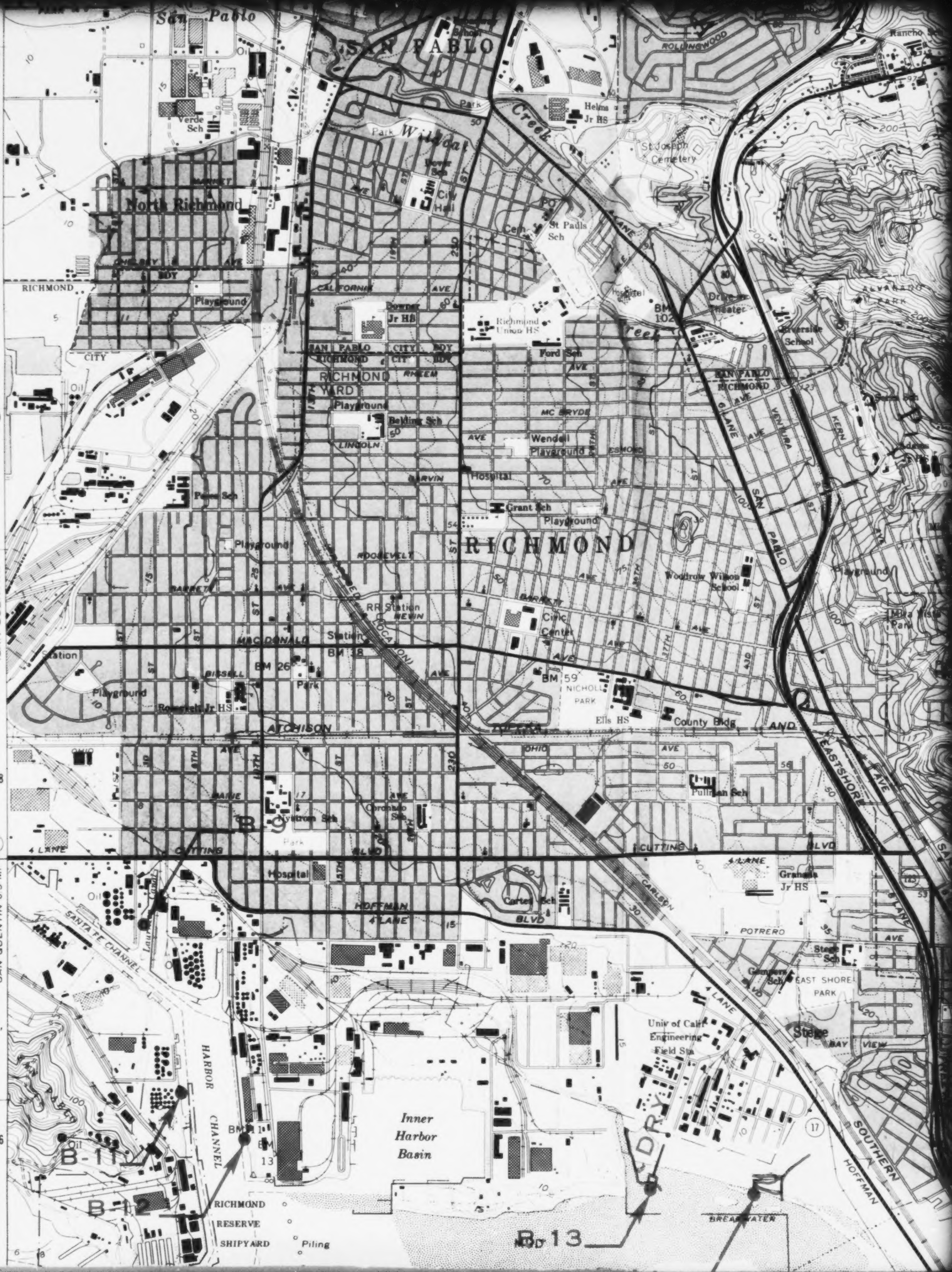
RODEO 4.6 MI.
PINOLE 1.8 MI.
1560 III SE
(MARE ISLAND)
20'
17'30"
SAN PABLO
OIL TANK FARM
Dam
Garrity
Creek
FREEWAY
RICHMOND
CITY
BOUNDARY
Tara Hills School
Maloney Reservoir
Aban'd Reservoir
6 LANE
Pinole High Sch
PINOLE
Stewart Sch
Crespi Jr HS
El Sobrante Sch
Sobrante Reservoir
Water
HILLTOP
DRIVE
GROOM
North Res
Contra Costa College
Fairmede School
El Portal Sch
EASTSHORE
6 LANE
El Sobrante
Fire Sta
APPIAN
San Pablo
4 LANE
SAN PABLO
Sheldon Sch
ROLLINGWOOD
Rancho Sch
Helms Jr HS
Creek
St Joseph Cemetery
Hillview School
St Pauls Sch
Cem
Hospital
BM 102
Drive-in Theater
Richmond Union HS
Riverside School
ALVARADO PARK
Ford Sch
SAN PABLO
RICHMOND
MC BRYDE
Springs
Spring
SAN

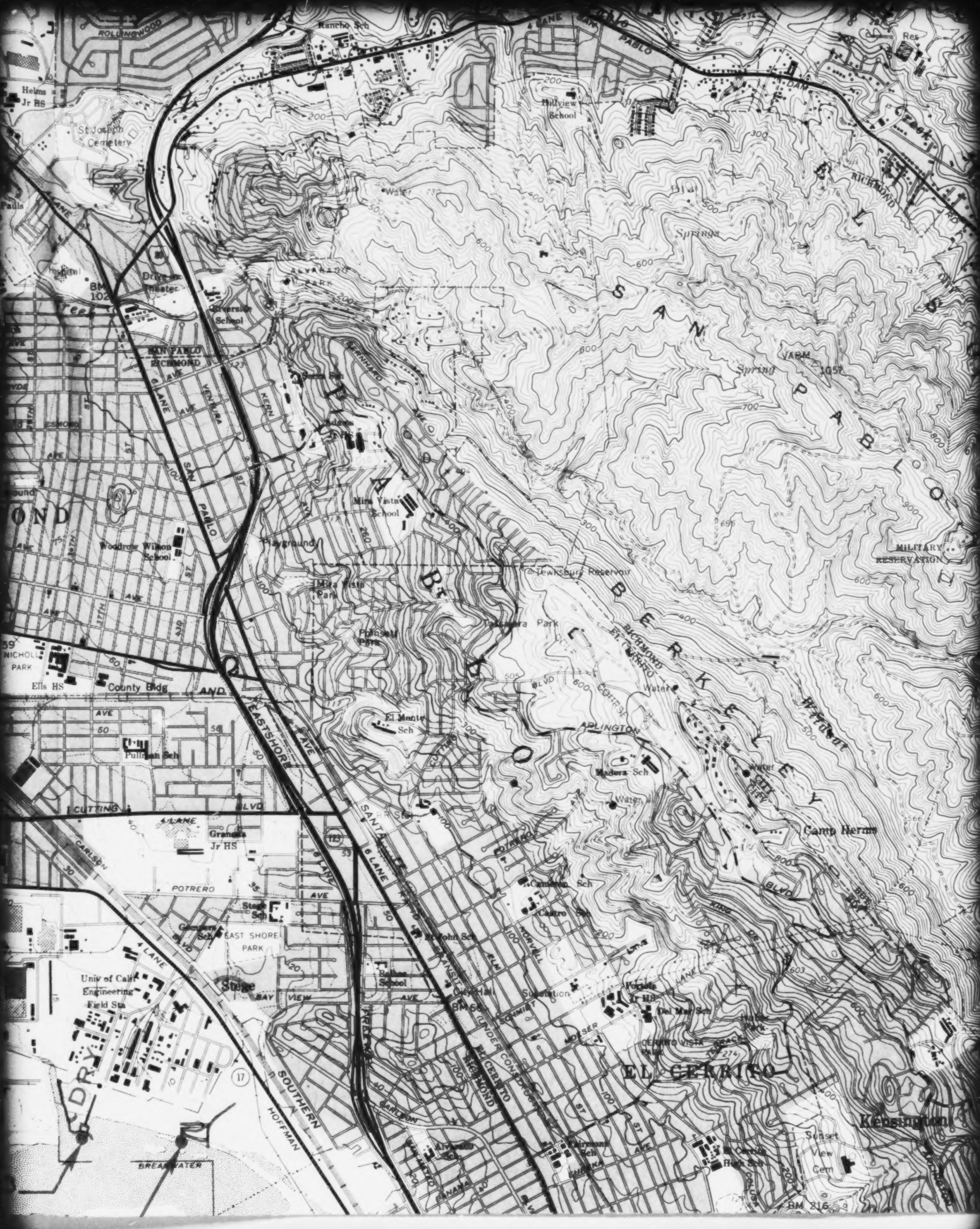
48-b

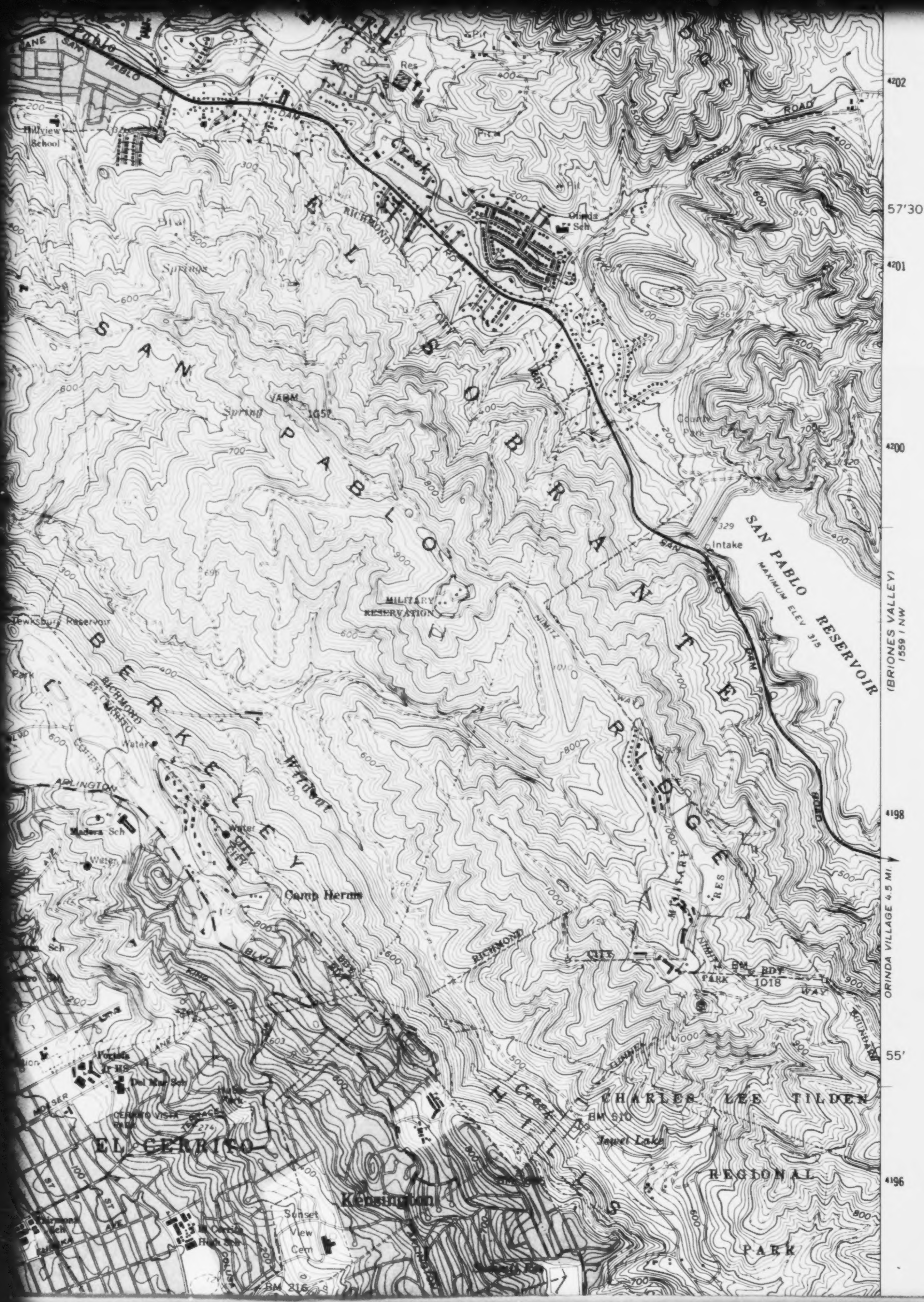
NIA
ERNOR
ATER RESOURCES

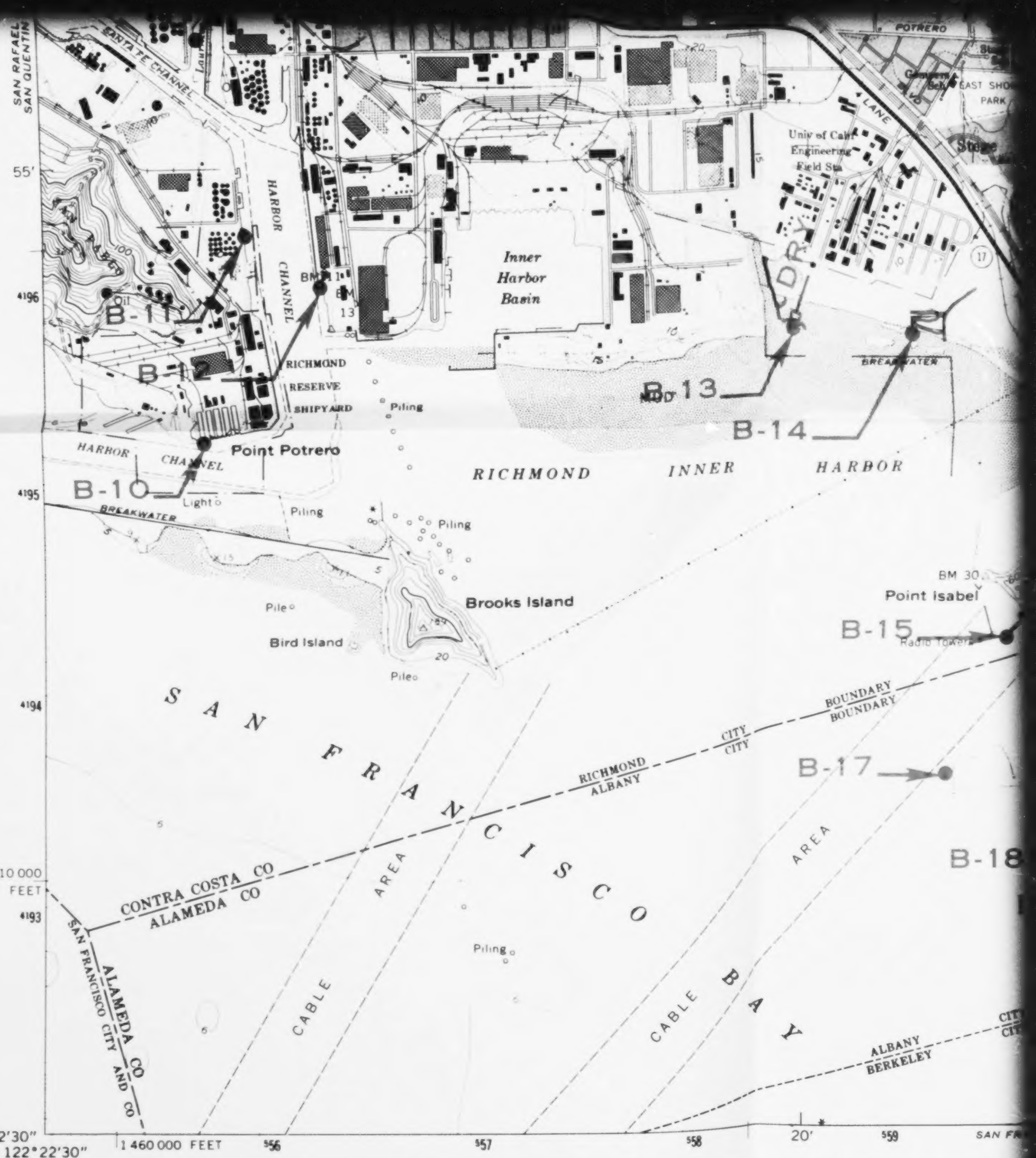
RICHMOND QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)


1560 II SW (BENICIA)
17'30"
SACRAMENTO 67 MI.
VALLEJO 8.9 MI.
1 490 000 FEET
565
122°15'
38°00'
550 000 FEET
4205
4204
4203
4202
57'30"
4201
4200
Malonex Reservoir
Aban'd Reservoir
6 LANE
Pinole High Sch
Stewart Sch
PINOLE
HERCULES
Farm
PINOLE RIDGE
P I N O L E
CITY BOUNDARY
Pinole VALLEY
Sobrante Reservoir
El Sobrante Sch
Ellerhorst Sch
PINOLE ROAD
Cr
El Sobrante
Murphy Sch
Valley View Sch
De Anza H S
Sheldon Sch
San Pablo
4 LANE
SAN PABLO
Hillview School
Res
Pit
RIDGE
ROAD
Creek
RICHMOND RD
Olinda Sch
Springs
Spring
VABM 1057
County Park
S A N P A B L O
200
300
400
500
600
700


San Pablo
SAN PABLO
Rollingwood
Rancho Sch
4202
Verde Sch
Helms Jr HS
Creek
Wildcat
Park
St Joseph Cemetery
57'30"
North Richmond
Dover Sch
City Hall
PO
St Pauls Sch
Cem
4201
Hospital
Drive-in Theater
BM 102
Alvarado Park
Richmond
Playground
California Ave
Downer Jr HS
Richmond Union HS
Riverside School
City
Ford Sch
San Pablo
Richmond
City
Richmond Yard
Rheem
Playground
Belding Sch
Mc Bryde
4200
Lincoln
Wendell Playground
Peres Sch
Hospital
Grant Sch
Playground
Richmond
Playground
Roosevelt
Woodrow Wilson School
Barrett
1559 IV NW (San Quentin)
RR Station
Nevin
Civic Center
Macdonald
Station
BM 18
Station
BM 26
Park
BM 59
Nicholl Park
Playground
Roosevelt Jr HS
Ells HS
County Bldg
Atchison
Topeka
And
Eastshore
Ohio
Ohio Ave
4198
Pullman Sch
Nystrom Sch
Coronado Sch
Park
B-9
17
4 Lane
Cutting
Cutting Blvd
San Rafael 9.9 MI
San Quentin 6.5 MI
Hospital
Hoffman
4 Lane
Cortez Sch
Carlson
Granada Jr HS
Potrero Ave
Santa Fe Channel
Stege Sch
Gompers Sch
East Shore Park
55'
Harbor Channel
Univ of Calif Engineering Field Sta
Stege
Bay View
Inner Harbor Basin
BM 11
BM 13
Dry
17
Hoffman
Southern
4196
B-11
B-12
Richmond Reserve Shipyard
Piling
Breakwater
B-13
Mud


Rollingwood
Rancho Sch
Helms Jr HS
St Joseph Cemetery
Hillview School
San Pablo
Dam
Creek
Res
Richmond
Water
Springs
Spring
1057
Alvarado Park
Drive-in Theater
BM 102
Riverside School
San Pablo
Richmond
San Pablo
Berkeley
Mira Vista School
Playground
Woodrow Wilson School
Mira Vista Park
Tewksbury Reservoir
Military Reservation
Poinsett Park
Tassajara Park
Nicholl Park
Ells HS
County Bldg
Eastshore
El Monte Sch
Arlington
Madera Sch
Wildcat
Pullman Sch
Camp Herms
Cutting Blvd
Granada Jr HS
Carlson
Potrero
Santa Fe
Castro Sch
Stege Sch
East Shore Park
St John Sch
Univ of Calif Engineering Field Sta
Stege
Bay View
Balboa School
City Hall
BM 64
Portola Jr HS
Del Mar Sch
Harding Park
Cerrito Vista Park
El Cerrito
Kensington
Southern
Hoffman
Breakwater
Fairmont Sch
El Cerrito High Sch
Sunset View Cem
BM 216


SAN PABLO
Pablo
Creek
RICHMOND RD
Hillview School
Res
Pit
ROAD
Olinda Sch
Springs
Spring
VABM 1057
SAN PABLO RIDGE
EL SOBRANTE RIDGE
County Park
SAN PABLO RESERVOIR
MAXIMUM ELEV 315
Intake
329
SAN PABLO DAM ROAD
MILITARY RESERVATION
Tewksbury Reservoir
Park
BERKELEY HILLS
RICHMOND
EL CERRITO
ARLINGTON
Water
Madera Sch
CITY
Wildcat
Camp Herms
BLVD
NIMITZ WAY
MILITARY RES
CITY PARK BDY
BM 1018
TUNNEL
CHARLES LEE TILDEN REGIONAL PARK
BM 510
Jewel Lake
Creek
Portola Jr HS
Del Mar Sch
CERRITO VISTA PARK
EL CERRITO
Kensington
Sunset View Cem
El Cerrito High Sch
Fairmont Sch
BM 216
4202
57'30"
4201
4200
4198
55'
4196
(BRIONES VALLEY)
1559 I NW
ORINDA VILLAGE 4.5 MI.


SAN RAFAEL
SAN QUENTIN
SANTA FE CHANNEL
POTRERO
HARBOR CHANNEL
Inner Harbor Basin
Univ of Calif Engineering Field Sta
EAST SHORE PARK
LANE
17
55′
4196
4195
4194
4193
B-11
B-12
B-13
B-14
B-10
B-15
B-17
B-18
BM 11
BM 13
RICHMOND RESERVE SHIPYARD
Piling
Point Potrero
HARBOR CHANNEL
RICHMOND INNER HARBOR
BREAKWATER
Light
Piling
Brooks Island
Pile
Bird Island
Point Isabel
BM 30
Radio Towers
SAN FRANCISCO BAY
CABLE AREA
CABLE AREA
BOUNDARY
CITY
RICHMOND
ALBANY
CONTRA COSTA CO
ALAMEDA CO
SAN FRANCISCO CITY AND CO
ALAMEDA CO
Piling
ALBANY
BERKELEY
510 000 FEET
37°52′30″
122°22′30″
1 460 000 FEET
556
557
558
20′
559
(SAN FRANCISCO NORTH)
1559 IV SW

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography from aerial photographs by photogrammetric methods and by planetable surveys 1947. Revised from aerial photographs taken 1958. Field check 1959

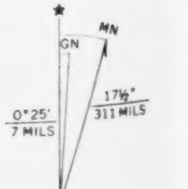
Hydrography compiled from USC&GS chart 5532 (1958)

Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system, zone 3
1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

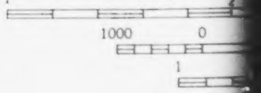
Red tint indicates areas in which only landmark buildings are shown

Data shown in purple compiled from aerial photographs taken 1968. This information not field checked

Purple tint indicates extension of urban areas

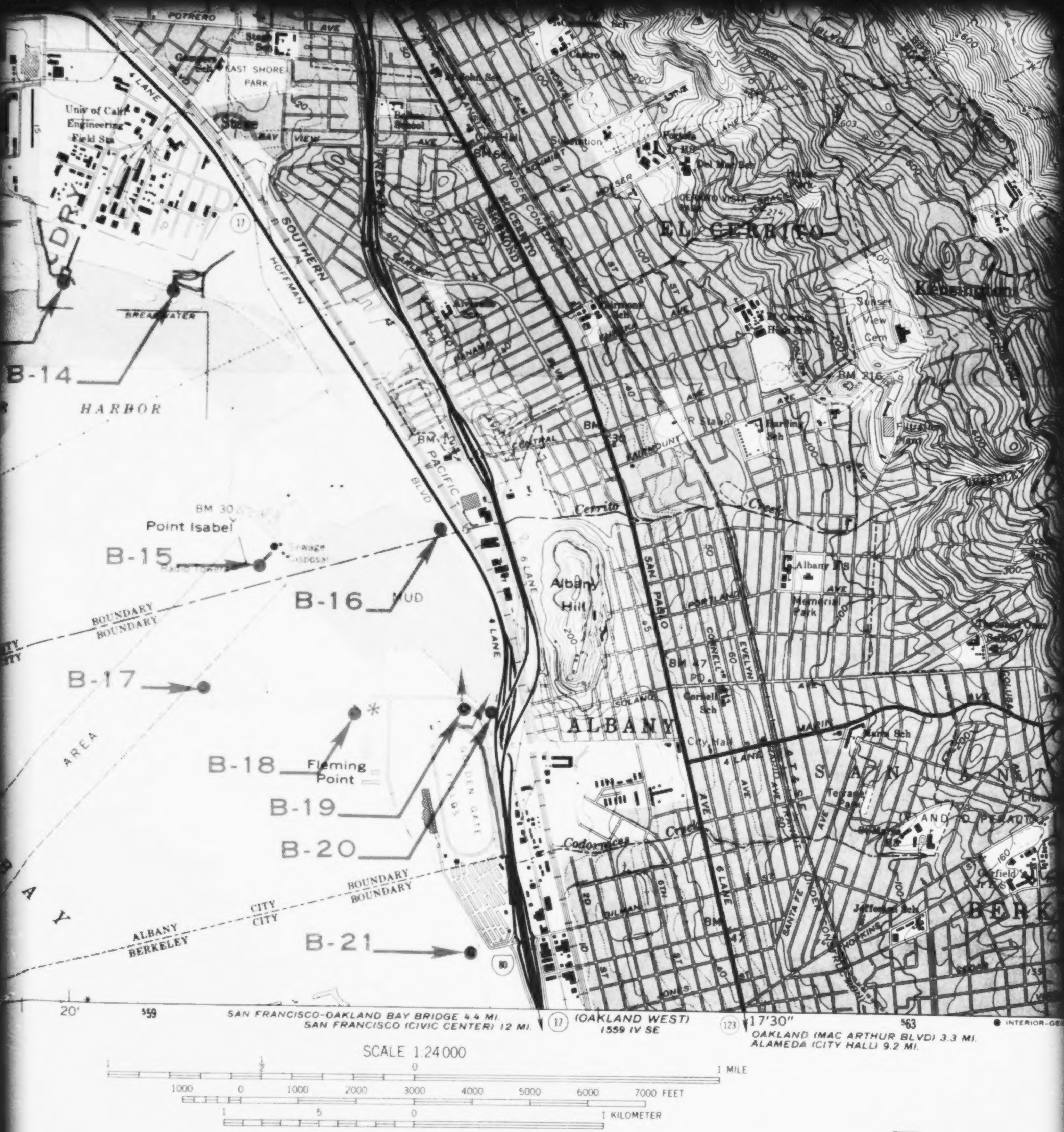

GN
MN
0°25′
7 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

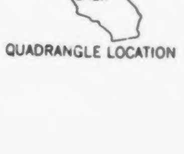


DEPTH C
SHORELINE

THIS MA
FOR SALE BY U.S. GEOLOGI
A FOLDER DESCRIBI


B-14
B-15
B-16
B-17
B-18
B-19
B-20
B-21
HARBOR
Point Isabel
Radio Towers
Sewage Disposal
Mud
Fleming Point
BM 30
BOUNDARY
CITY
ALBANY
BERKELEY
AREA
BAY
EL CERRITO
Kensington
ALBANY
Albany Hill
Sunset View Cem
Univ of Calif Engineering Field Sta
EAST SHORE PARK
SOUTHERN PACIFIC
HOFFMAN BLVD
SAN PABLO
Cerrito Creek
Codornices Creek
Golden Gate Fields
Memorial Park
Filtration Plant
POTRERO AVE
BAY VIEW AVE
4 LANE
6 LANE
17
80
123
20'
559
563
17'30"
SAN FRANCISCO-OAKLAND BAY BRIDGE 4.4 MI.
SAN FRANCISCO (CIVIC CENTER) 12 MI.
(OAKLAND WEST)
1559 IV SE
OAKLAND (MAC ARTHUR BLVD) 3.3 MI.
ALAMEDA (CITY HALL) 9.2 MI.
INTERIOR-GE
SCALE 1:24000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4 FEET



QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

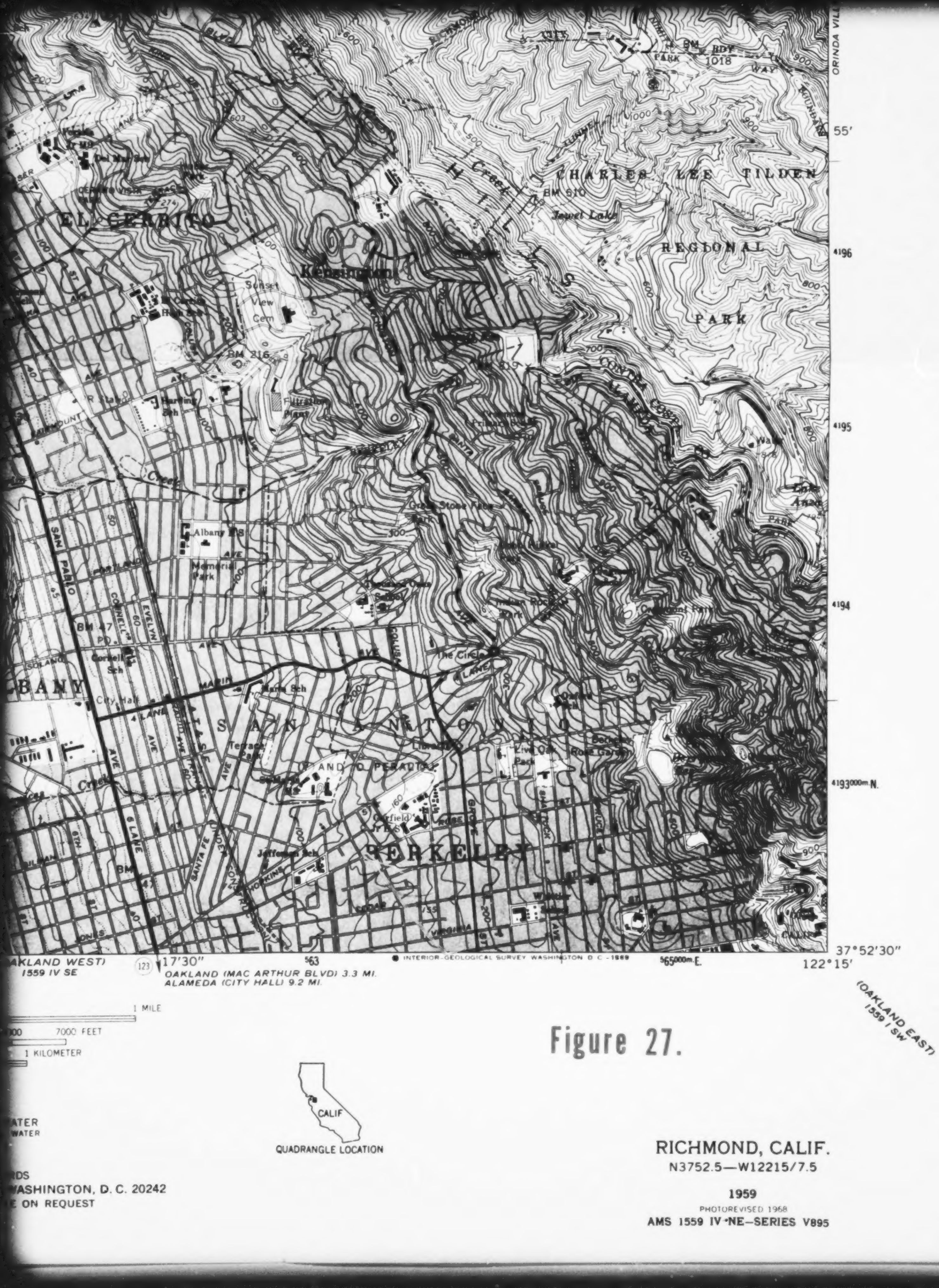
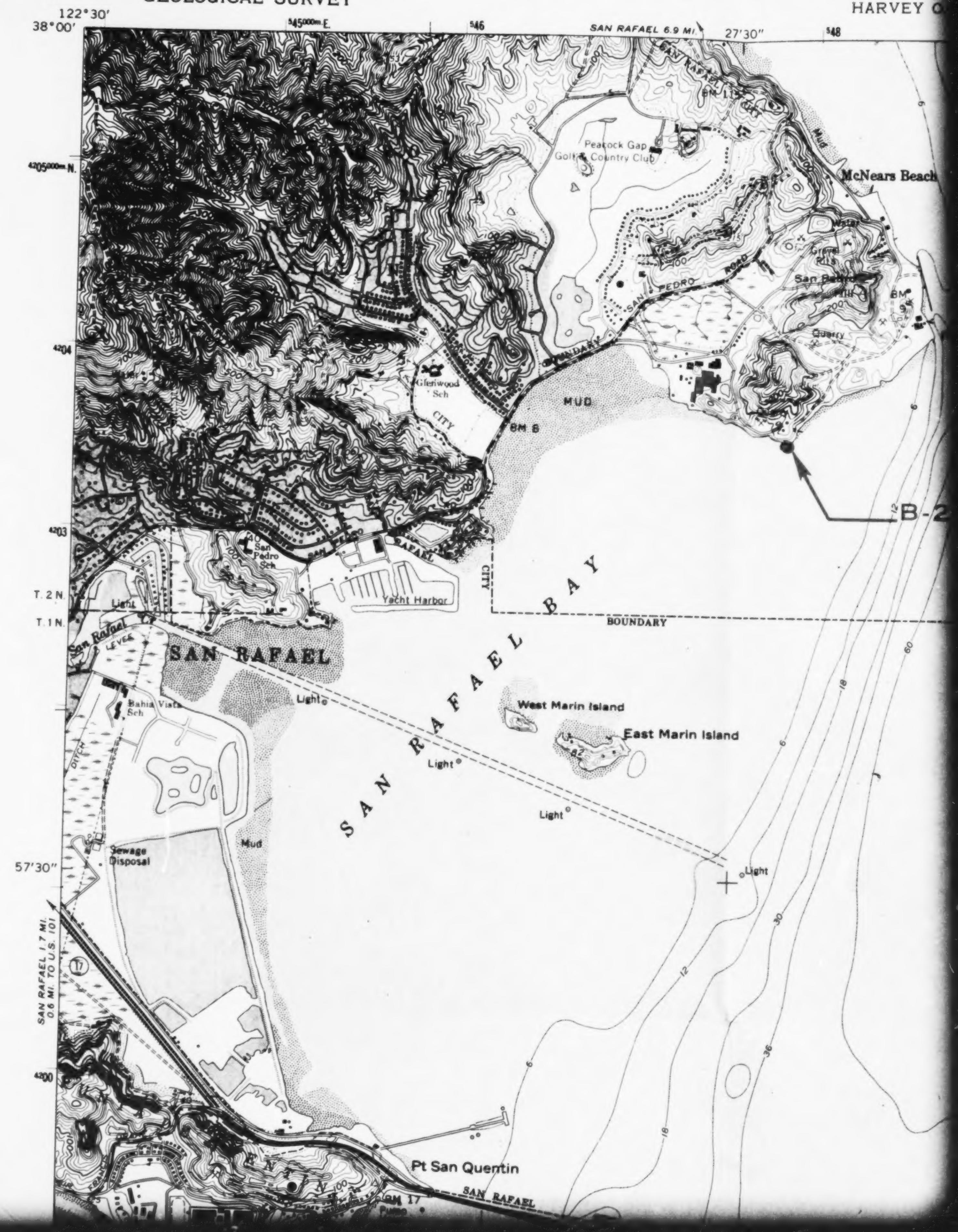
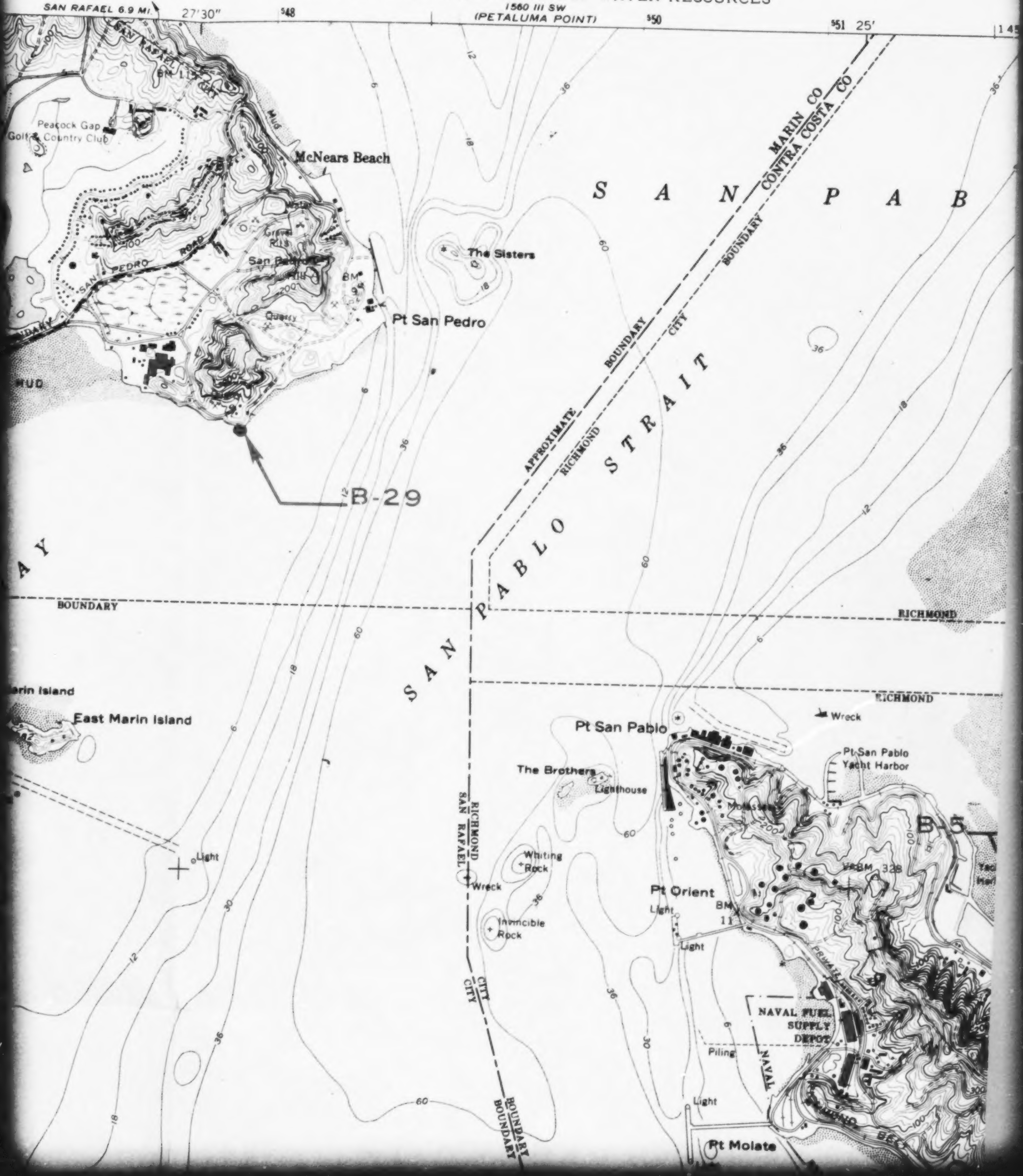

EL CERRITO
Kensington
Sunset View Cem
Filtration Plant
CHARLES LEE TILDEN REGIONAL PARK
Jewel Lake
Creek
TUNNEL
CONTRA COSTA
ALAMEDA
BM 510
BM 216
Harding Sch
FAIRMOUNT
Albany HS
Memorial Park
SAN PABLO AVE
CORNELL
EVELYN
BM 47
Cornell Sch
ALBANY
City Hall
MARIN
Marin Sch
The Circle
SAN ANTONIO
Terrace Park
Live Oak Park
Rose Garden
Garfield JR HS
Jefferson Sch
BERKELEY
SANTA FE
HOPKINS
VIRGINIA
GROVE
SHATTUCK
Washington Sch
Lake Anza
55′
4196
4195
4194
4193000m.N.
37°52′30″
122°15′
17′30″
563
565000m.E.
INTERIOR-GEOLOGICAL SURVEY WASHINGTON D C -1969
(OAKLAND WEST) 1559 IV SE
OAKLAND (MAC ARTHUR BLVD) 3.3 MI.
ALAMEDA (CITY HALL) 9.2 MI.
(OAKLAND EAST) 1559 I SW
ORINDA
1 MILE
7000 FEET
1 KILOMETER
WATER
WATER
CALIF
QUADRANGLE LOCATION
WASHINGTON, D. C. 20242
ON REQUEST
RICHMOND, CALIF.
N3752.5—W12215/7.5
1959
PHOTOREVISED 1968
AMS 1559 IV NE—SERIES V895

Figure 27.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY


1460 II SE
(NOVATO)
122°30'
38°00'
545000m E.
546
548
27'30"
HARVEY O
SAN RAFAEL 6.9 MI.
4205000m N.
4204
4203
4200
57'30"
T. 2 N.
T. 1 N.
Peacock Gap
Golf & Country Club
McNears Beach
Mud
Water
Gravel Pits
San Pedro Hill
Quarry
SAN PEDRO ROAD
BOUNDARY
CITY
MUD
BM 6
Glenwood Sch
San Pedro Sch
Yacht Harbor
Light
San Rafael Cr
LEVEE
SAN RAFAEL
Bahia Vista Sch
DITCH
SAN RAFAEL BAY
West Marin Island
East Marin Island
Sewage Disposal
Mud
B-2
SAN RAFAEL 1.7 MI.
0.6 MI. TO U.S. 101
17
Pt San Quentin
BM 17
SAN RAFAEL
6
12
18
30
36
60

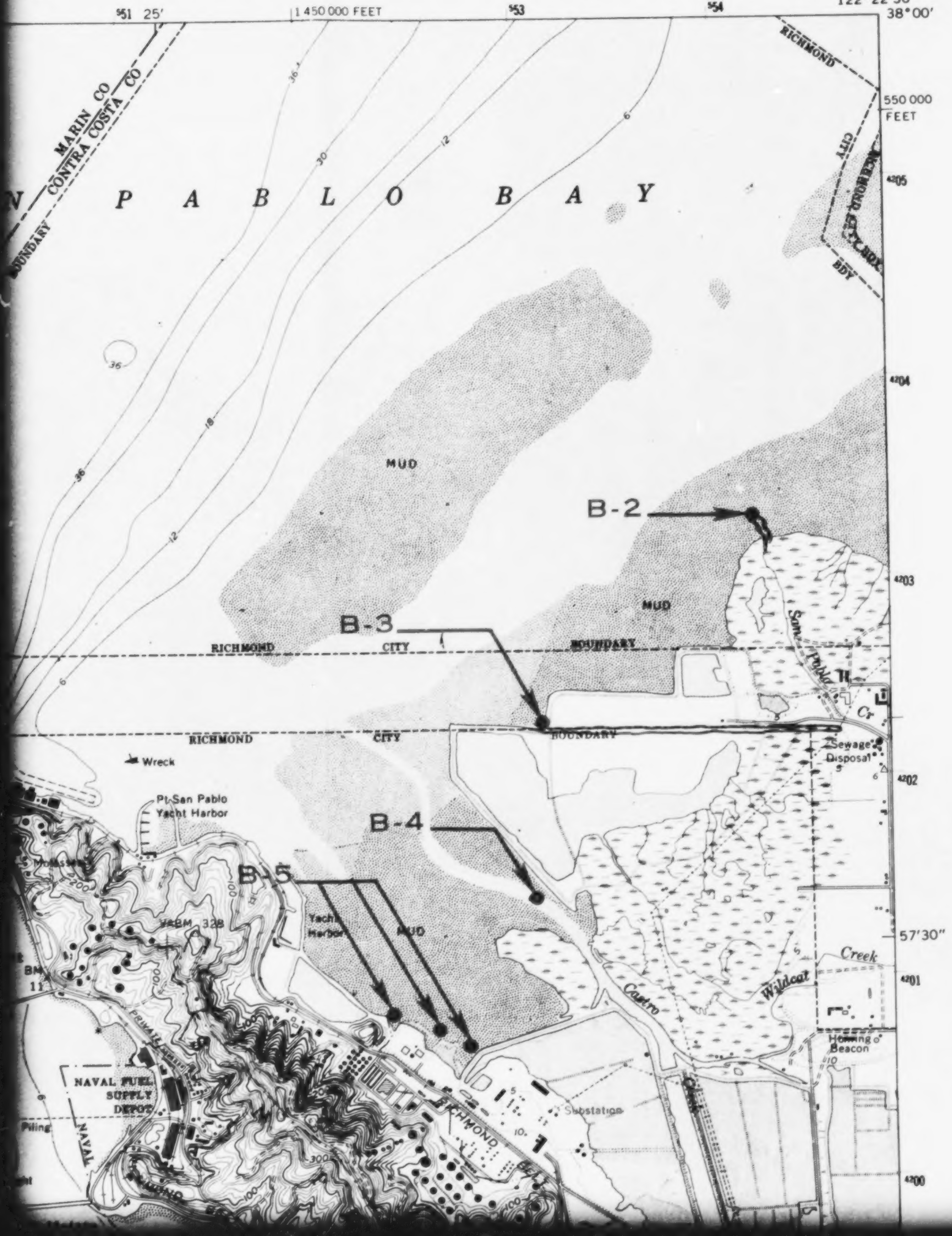
STATE OF CALIFORNIA
EDMUND G. BROWN, GOVERNOR
HARVEY O. BANKS, DIRECTOR OF WATER RESOURCES


SAN RAFAEL 6.9 MI.
27'30"
548
1560 III SW
(PETALUMA POINT)
550
551
25'
Peacock Gap
Golf & Country Club
McNears Beach
SAN RAFAEL
SAN PEDRO ROAD
San Pedro Hill
Quarry
Pt San Pedro
The Sisters
MUD
B-29
SAN PABLO
MARIN CO
CONTRA COSTA CO
APPROXIMATE BOUNDARY
RICHMOND CITY BOUNDARY
SAN PABLO STRAIT
BAY
BOUNDARY
RICHMOND
Marin Island
East Marin Island
Light
Pt San Pablo
Wreck
Pt San Pablo Yacht Harbor
The Brothers
Lighthouse
Molate
B-5
RICHMOND
SAN RAFAEL
CITY
CITY
BOUNDARY
BOUNDARY
Whiting Rock
Wreck
Invincible Rock
Pt Orient
Light
BM 11
BM 328
Light
NAVAL FUEL SUPPLY DEPOT
NAVAL
PRIVATE
Piling
Light
Pt Molate
BELT
6
12
18
30
36
60
100
200
300

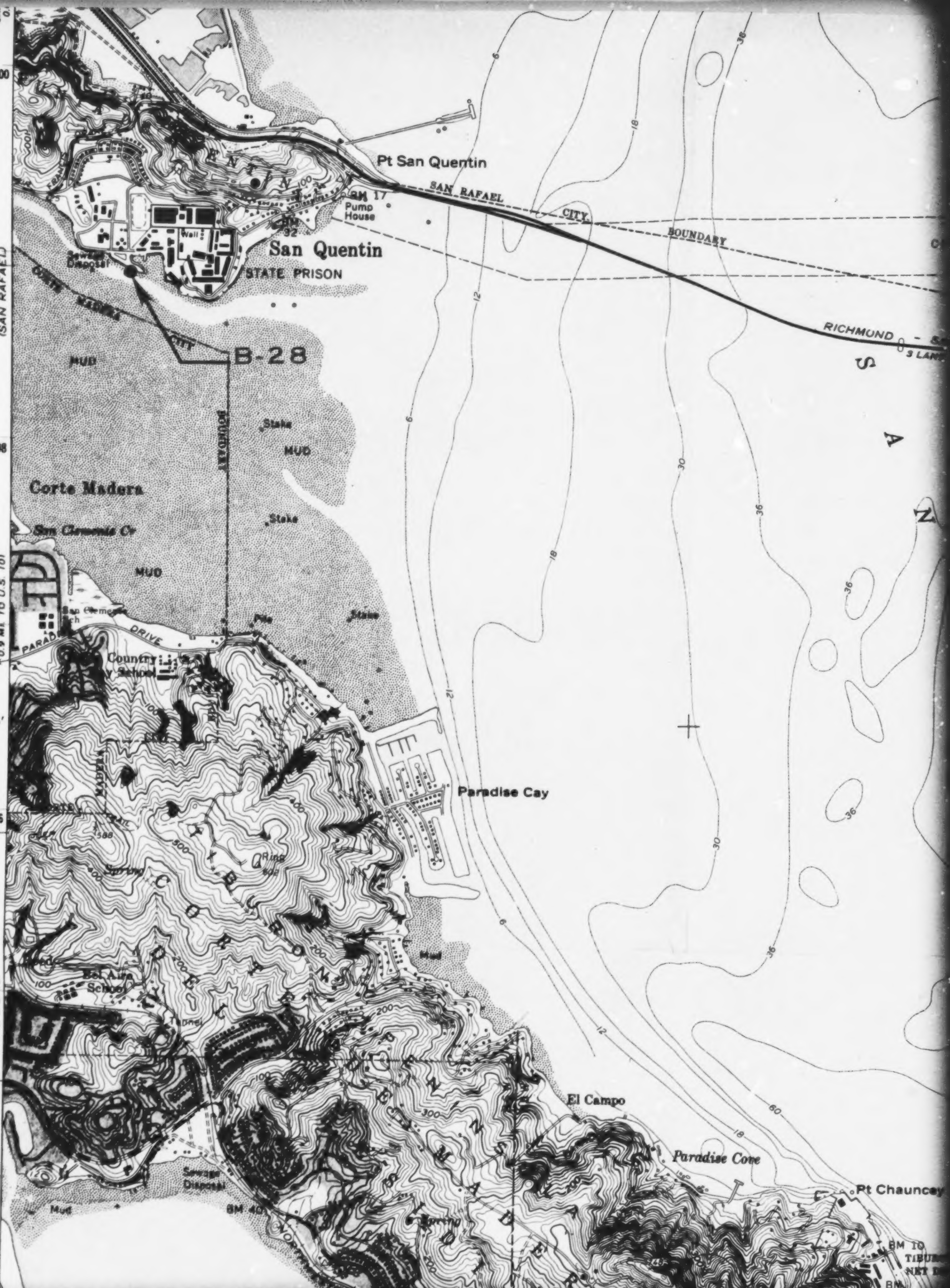
48-C

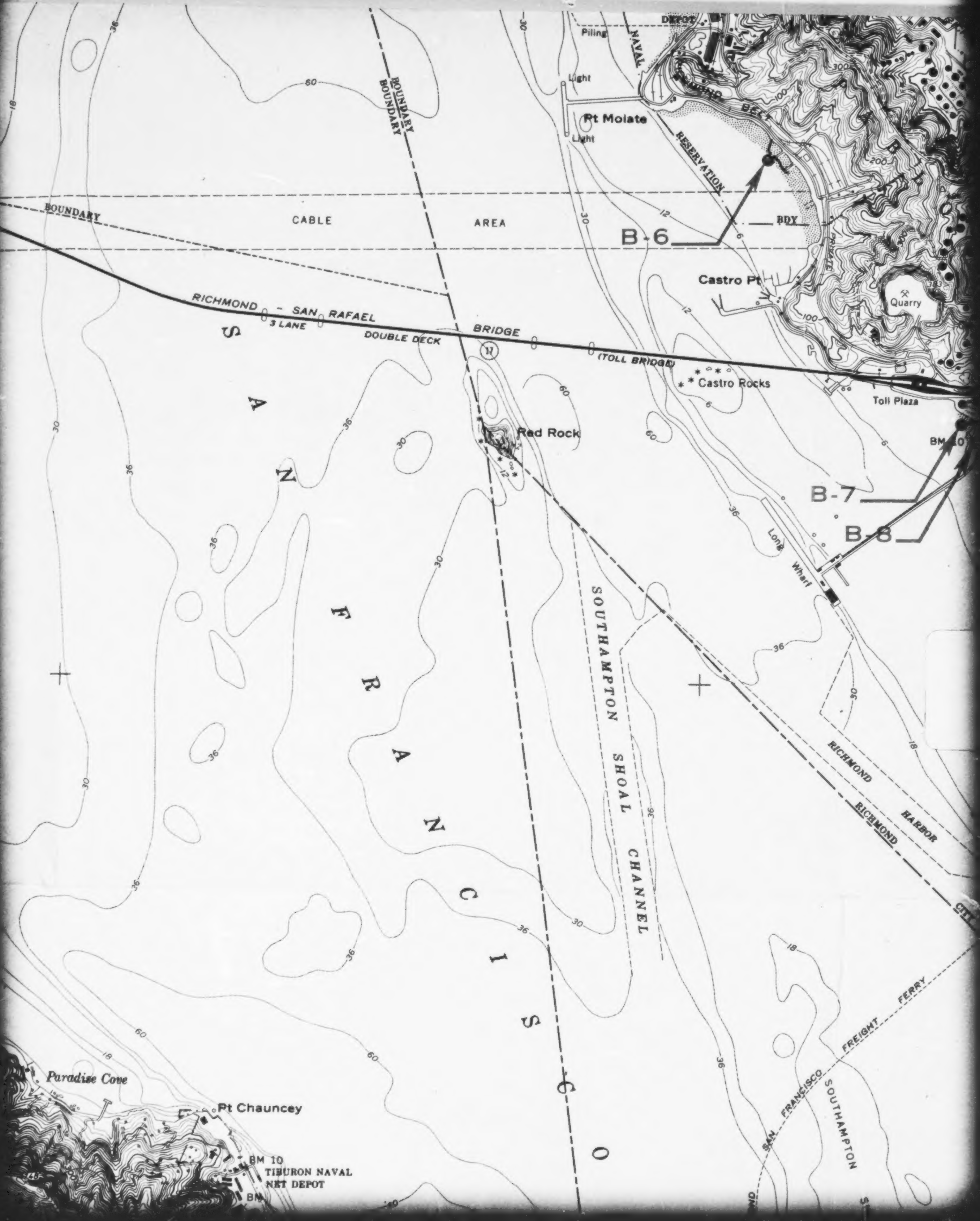
SAN QUENTIN QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

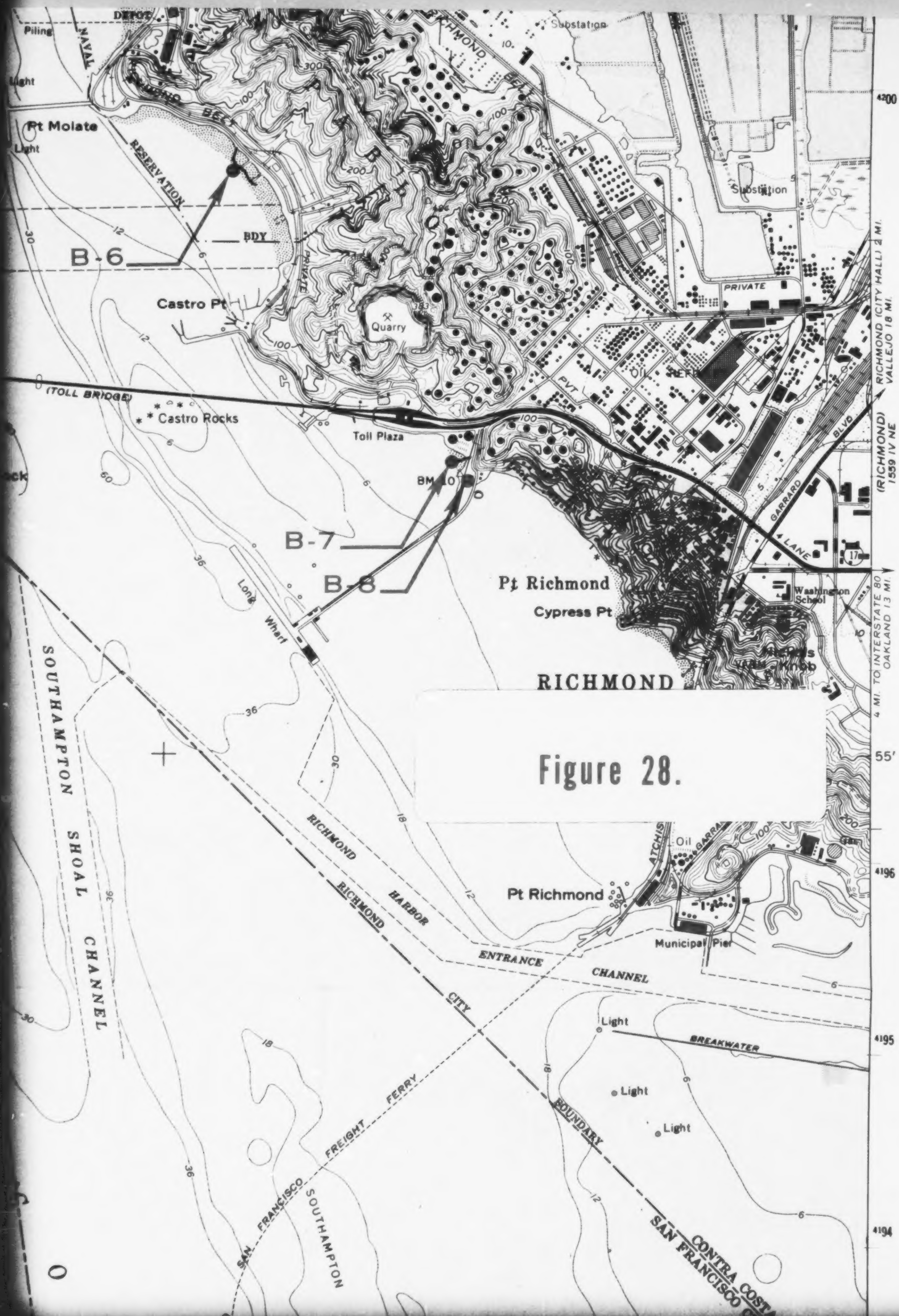
RCES



1560 III SE
(MARE ISLAND)
551 25'
1 450 000 FEET
553
554
122°22'30"
38°00'
550 000
FEET
4205
4204
4203
4202
4201
4200
57'30"
MARIN CO
CONTRA COSTA CO
BOUNDARY
PABLO BAY
RICHMOND
CITY
RICHMOND CITY BDY
BDY
MUD
MUD
MUD
B-2
B-3
B-4
B-5
RICHMOND CITY BOUNDARY
RICHMOND CITY BOUNDARY
Wreck
Pt San Pablo
Yacht Harbor
Yacht Harbor
VABM 328
BM 11
NAVAL FUEL SUPPLY DEPOT
NAVAL
Piling
Sewage Disposal
San Pablo Cr
Castro
Wildcat
Creek
Homing Beacon
Substation
RICHMOND
36
30
18
12
6

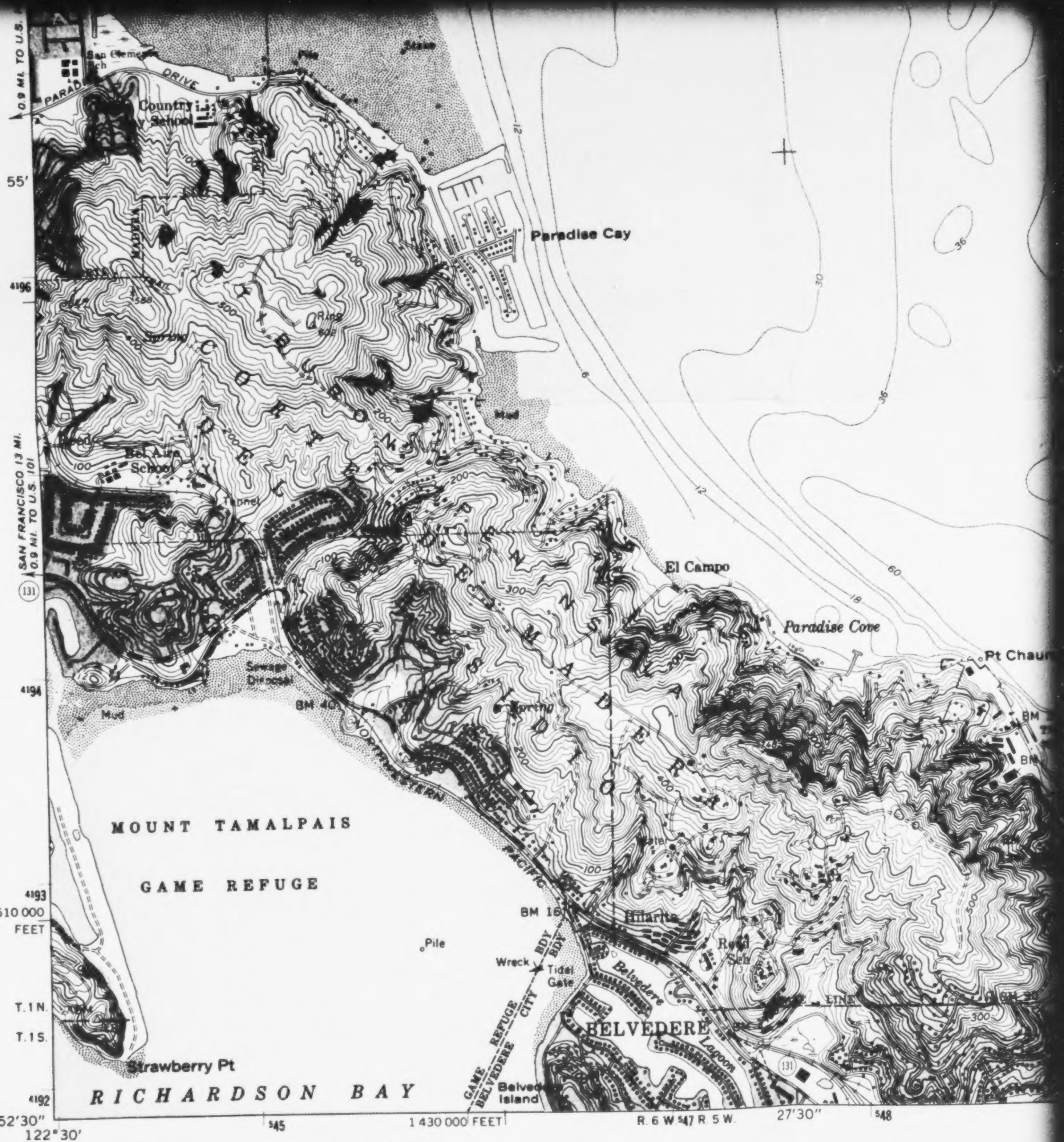

4200
Pt San Quentin
SAN RAFAEL CITY BOUNDARY
BM 17
Pump House
BM 32
Wall
San Quentin
STATE PRISON
Sewage Disposal
CORTE MADERA CITY BOUNDARY
B-28
1459 I NE (SAN RAFAEL)
MUD
Stake
MUD
4198
Corte Madera
San Clemente Cr
Stake
MUD
San Clemente Sch
Pile
Stake
0.9 MI. TO U.S. 101
PARADISE DRIVE
Country Day School
55′
Paradise Cay
4196
Ring
Spring
Mud
Bel Aire School
SAN FRANCISCO 13 MI. 0.9 MI. TO U.S. 101
131
El Campo
Paradise Cove
Sewage Disposal
4194
Mud
BM 40
Spring
Pt Chauncey
BM 10
RICHMOND - SAN
3 LANE
S A N
6
12
18
30
36
60


DEPOT
Piling
NAVAL
Light
Pt Molate
Light
RESERVATION
BELT
BOUNDARY
BOUNDARY
BOUNDARY
CABLE
AREA
BDY
B-6
Castro Pt
Quarry
RICHMOND - SAN RAFAEL
3 LANE
DOUBLE DECK
BRIDGE
17
(TOLL BRIDGE)
Castro Rocks
Toll Plaza
BM 10
Red Rock
B-7
B-8
Long Wharf
S A N
F R A N C I S C O
SOUTHAMPTON SHOAL CHANNEL
RICHMOND HARBOR
RICHMOND
CITY
SAN FRANCISCO SOUTHAMPTON FREIGHT FERRY
Paradise Cove
Pt Chauncey
BM 10
TIBURON NAVAL
NET DEPOT
BM
18
30
36
60
12
6
100
200
300



B-6
B-7
B-8
Pt Molate
Castro Pt
Castro Rocks
(TOLL BRIDGE)
Toll Plaza
Quarry
BM 10
NAVAL
DEPOT
RESERVATION
BDY
Piling
Light
Substation
PRIVATE
PVT
Oil
GARRARD
BLVD
4 LANE
Washington School
Pt Richmond
Cypress Pt
RICHMOND
Long Wharf
SOUTHAMPTON SHOAL CHANNEL
RICHMOND HARBOR ENTRANCE CHANNEL
RICHMOND CITY BOUNDARY
SAN FRANCISCO FREIGHT FERRY
SOUTHAMPTON
CONTRA COSTA
SAN FRANCISCO
Municipal Pier
BREAKWATER
Light
RICHMOND (CITY HALL) 2 MI.
VALLEJO 18 MI.
(RICHMOND)
1559 IV NE
4 MI. TO INTERSTATE 80
OAKLAND 13 MI.
4200
55′
4196
4195
4194

Figure 28.


0.9 MI. TO U.S.
San Clemente Sch
PARADISE DRIVE
Country Day School
55′
Paradise Cay
4196
Ring Mtn
C O R T E M A D E R A
Spring
Mud
Bel Aire School
SAN FRANCISCO 13 MI.
0.9 MI. TO U.S. 101
131
Tunnel
El Campo
Paradise Cove
Pt Chaun
Sewage Disposal
4194
Mud
BM 40
NORTHWESTERN
PACIFIC
Spring
MOUNT TAMALPAIS
GAME REFUGE
4193
510 000 FEET
BM 16
Hilarita
Reed Sch
Pile
Wreck
Tidal Gate
Belvedere Lagoon
BELVEDERE
LINE
T.1 N.
T.1 S.
Strawberry Pt
RICHARDSON BAY
GAME REFUGE BDY
BELVEDERE CITY BDY
Belvedere Island
4192
37°52′30″
122°30′
545
1 430 000 FEET
R. 6 W.
547
R. 5 W.
27′30″
548
12
30
36
60
18
100
200
300
400
500
580

(POINT BONITA)
1459 I SE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

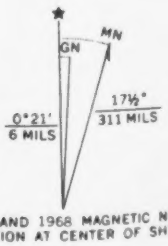
Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1958. Field check 1959

Hydrography compiled from USC&GS charts 5533 (1956) and 5532 (1958)

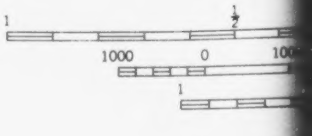
Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system, zone 3
1000-meter Universal Transverse Mercator grid ticks,
zone 10, shown in blue

Data shown in purple compiled from aerial photographs
taken 1968. This information not field checked

Purple tint indicates extension of urban areas


★
GN
MN
0°21′
6 MILS
17½°
311 MILS

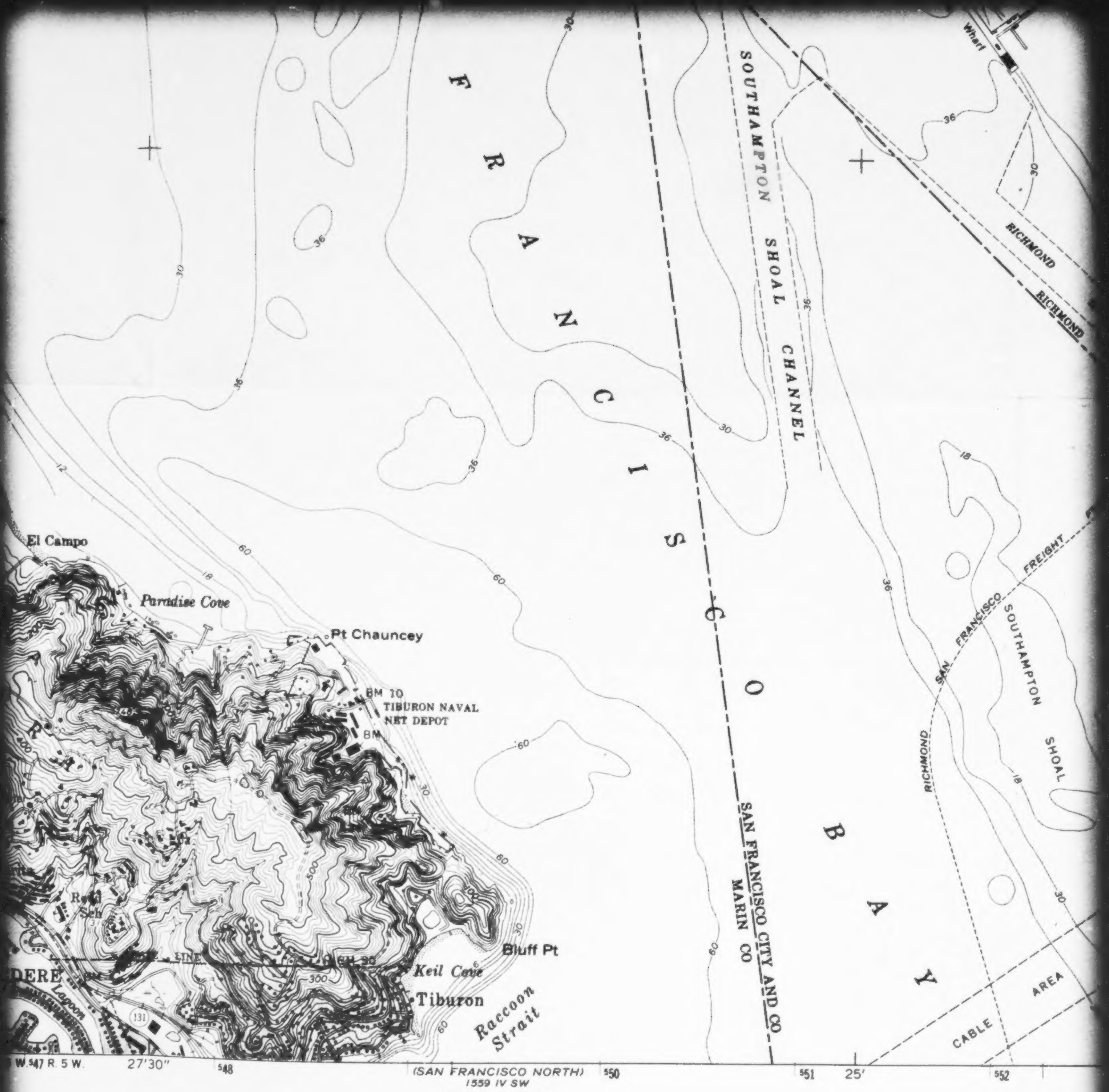
UTM GRID AND 1968 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET


1
½
1000
0
1000
1

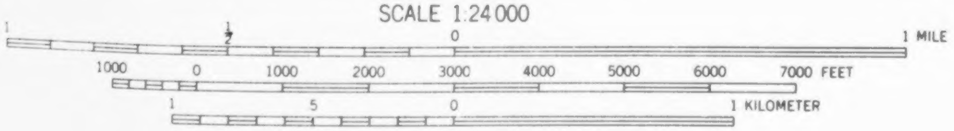
DOT

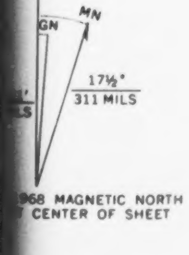
DEPTH CUR
SHORELINE SHO
THE

THIS MAP CO
FOR SALE BY U. S. GEOLOGICAL
A FOLDER DESCRIBING T


S A N F R A N C I S C O B A Y
SOUTHAMPTON SHOAL CHANNEL
Wharf
RICHMOND
RICHMOND
SAN FRANCISCO RICHMOND FREIGHT
SOUTHAMPTON SHOAL
CABLE AREA
SAN FRANCISCO CITY AND CO
MARIN CO
El Campo
Paradise Cove
Pt Chauncey
BM 10
TIBURON NAVAL NET DEPOT
Bluff Pt
Keil Cove
Tiburon
Raccoon Strait
Lagoon
131
BM 38
LINE
30
36
60
18
12
6
300
500
W. 547 R. 5 W.
27'30"
548
550
551
25'
552
(SAN FRANCISCO NORTH)
1559 IV SW

SCALE 1:24 000


1
½
0
1 MILE
1000
0
1000
2000
3000
4000
5000
6000
7000 FEET
1
.5
0
1 KILOMETER

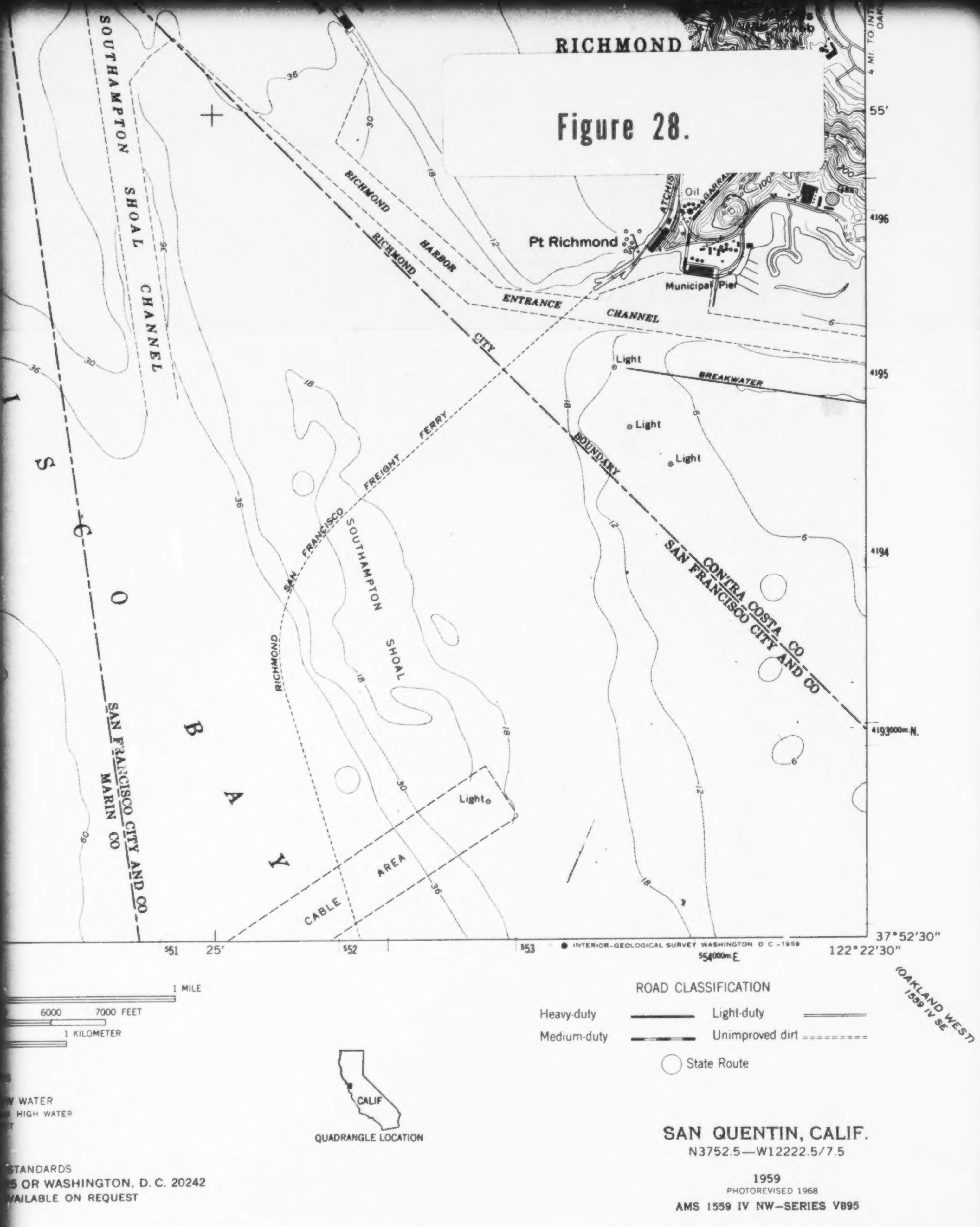

GN
MN
17½°
311 MILS
1968 MAGNETIC NORTH
CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4 FEET

QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Figure 28.


RICHMOND
55′
Pt Richmond
Oil
Municipal Pier
RICHMOND HARBOR ENTRANCE CHANNEL
RICHMOND CITY BOUNDARY
BREAKWATER
Light
Light
Light
Light
SOUTHAMPTON SHOAL CHANNEL
SOUTHAMPTON SHOAL
RICHMOND SAN FRANCISCO FREIGHT FERRY
CONTRA COSTA CO
SAN FRANCISCO CITY AND CO
SAN FRANCISCO CITY AND CO
MARIN CO
S C O
B A Y
CABLE AREA
36
30
18
12
6
60
4196
4195
4194
4193000m N.
37°52′30″
122°22′30″
551
25′
552
553
554000m E.
INTERIOR—GEOLOGICAL SURVEY WASHINGTON D C—1969
(OAKLAND WEST)
1559 IV SE
1 MILE
6000
7000 FEET
1 KILOMETER
W WATER
HIGH WATER
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
State Route
CALIF
QUADRANGLE LOCATION
STANDARDS
OR WASHINGTON, D. C. 20242
VAILABLE ON REQUEST
SAN QUENTIN, CALIF.
N3752.5—W12222.5/7.5
1959
PHOTOREVISED 1968
AMS 1559 IV NW—SERIES V895

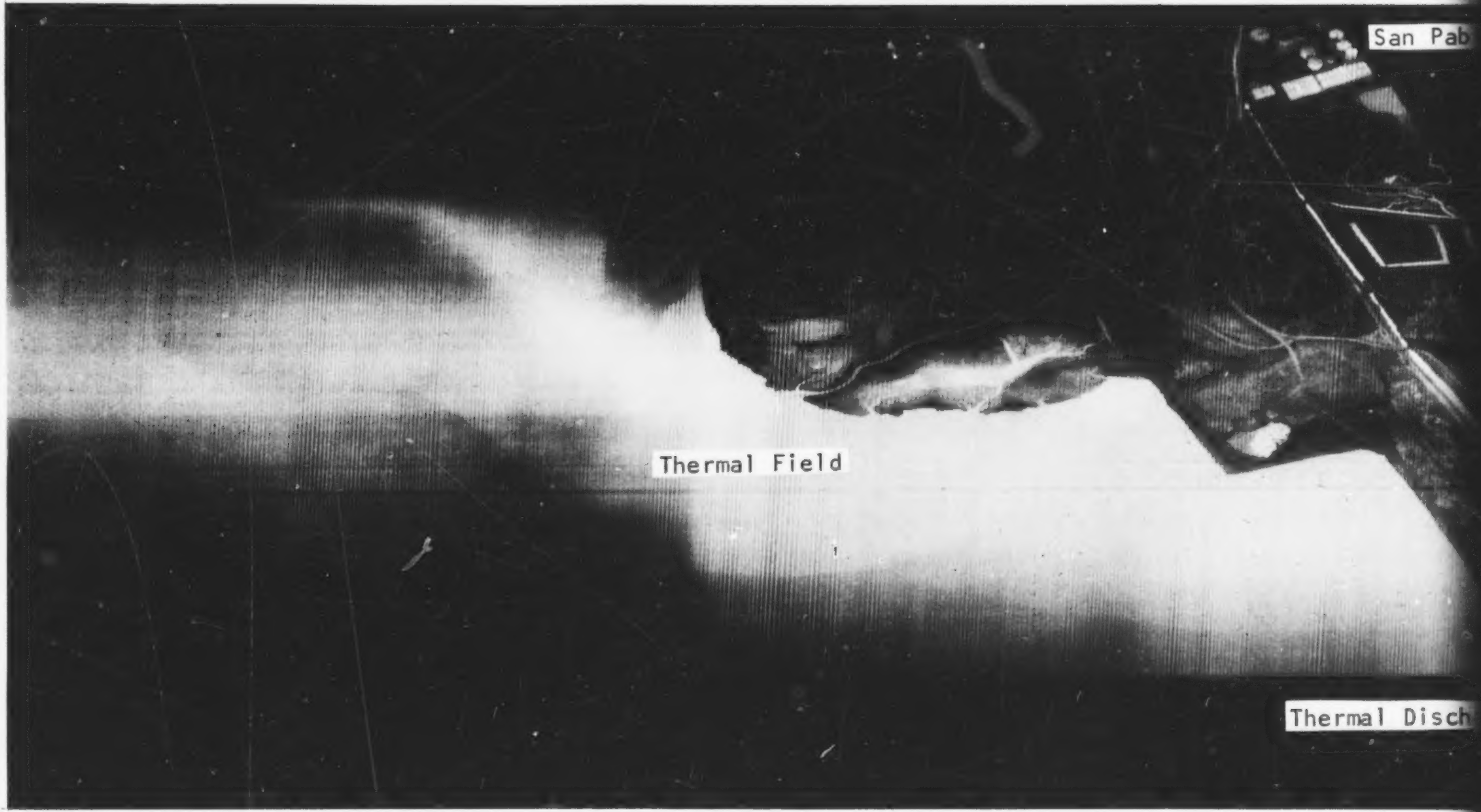
"July Night" - The STP effluent was somewhat warmer than the Bay waters, as shown in Figure 29.

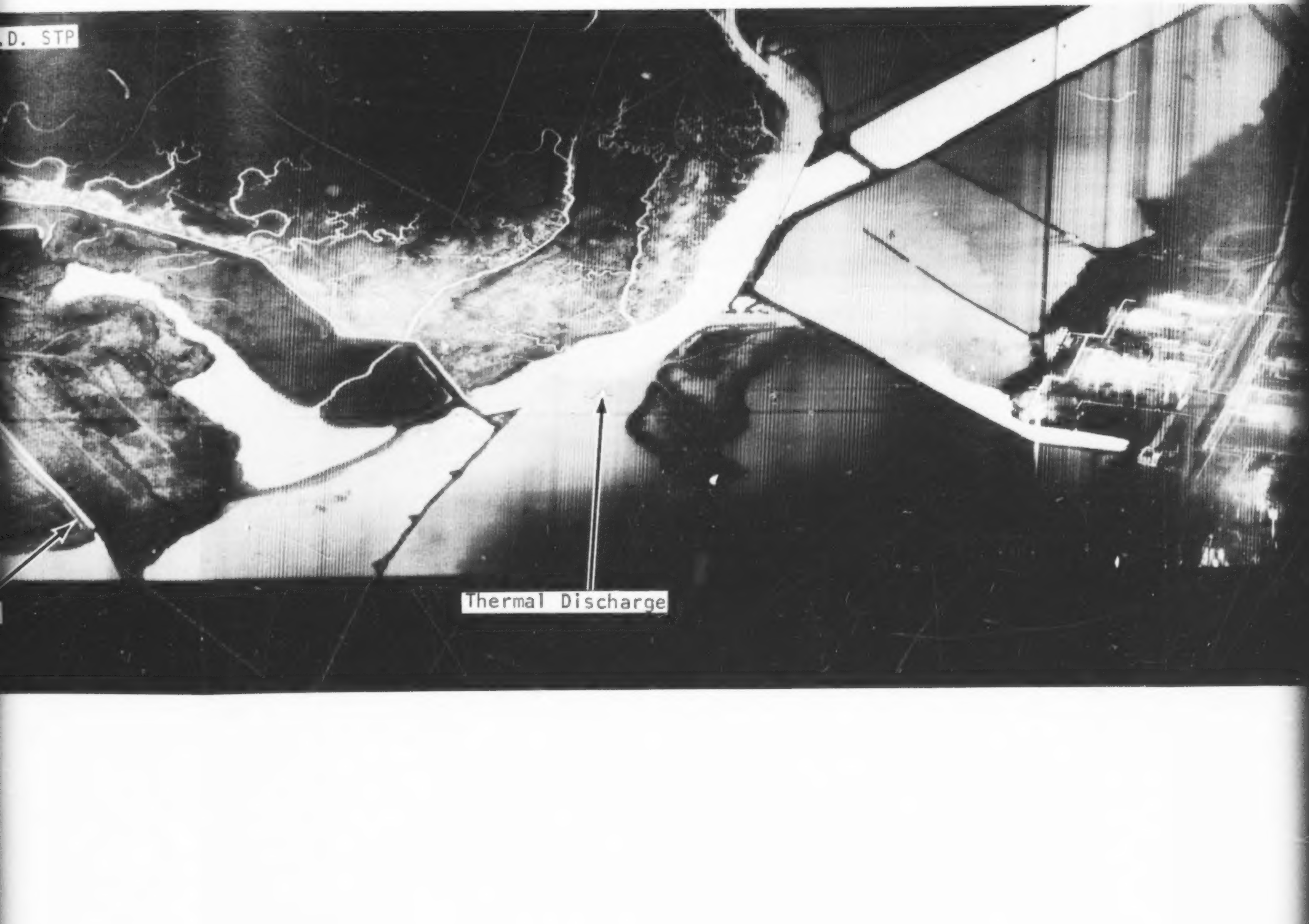
B-4 April - A large volume of wastewater was being discharged from two adjacent locations within the Standard Oil of California facility. These are the main outfalls of the facility. The wastewater was grayish brown in color and warmer than the receiving Bay waters. The amount of dissolved oxygen was low.

July - The large volume of discharged wastewater was present during this mission but displayed a grayish green color in addition to being warmer than the receiving water. The amount of dissolved oxygen in the wastewater was low.

"July Night" - The outfall was quite warm and covered a portion of the mud flat area. This is shown in Figure 29.

B-5 April - The three positions shown in Figure 28 are used, for the most part, as overflow discharge locations. Location "a" is a partially open ditch that originates within the refining operational area. It was not discharging at the time of flight. Location "b" is a partially open ditch that connects three holding ponds to the Bay. It was discharging a small volume of a dark-brown substance at the time of


San Pab
Thermal Field
Thermal Disch



.D. STP
Thermal Discharge

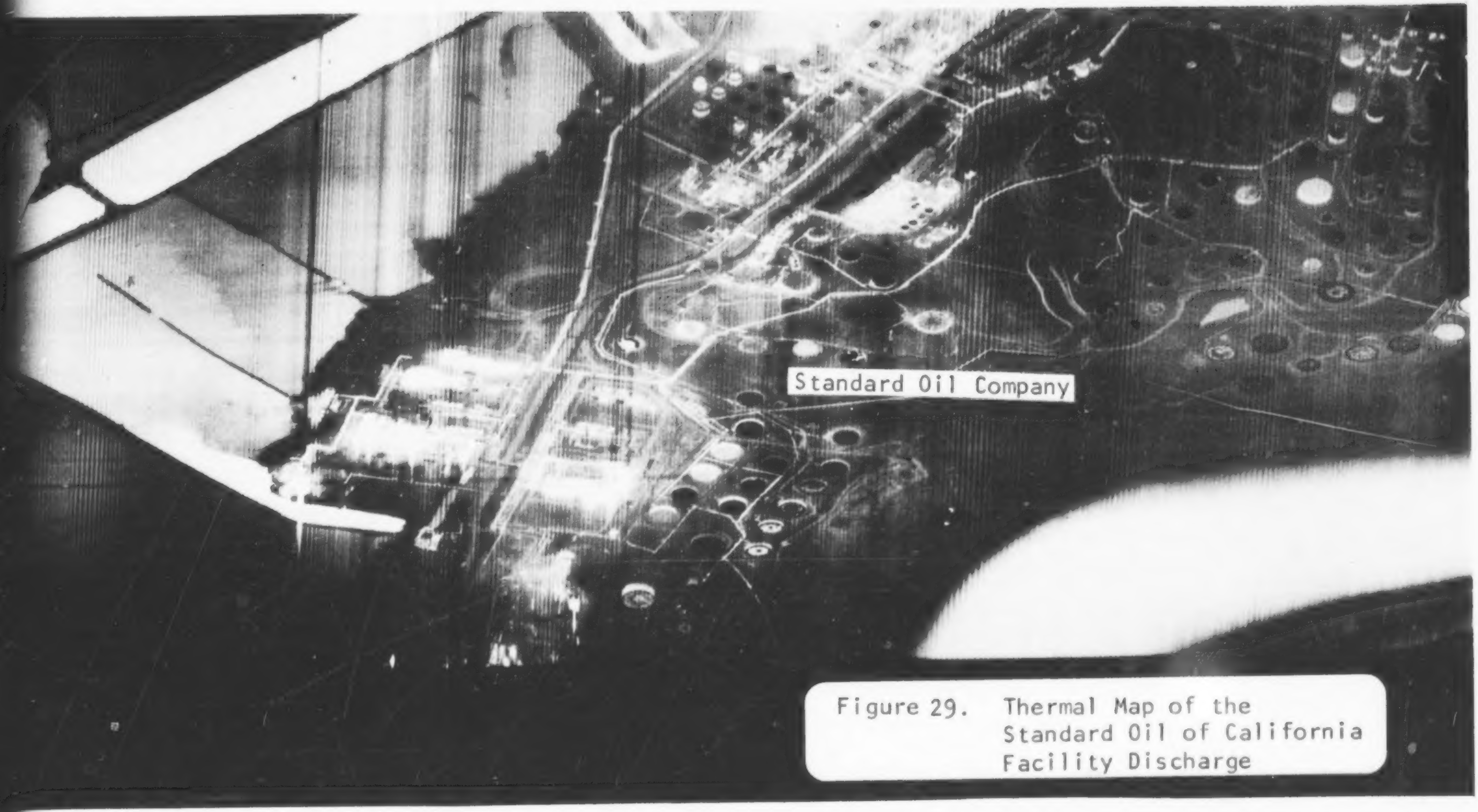

Standard Oil Company

Figure 29. Thermal Map of the Standard Oil of California Facility Discharge

flight. Location "c" is also a partially open ditch that connects the outflow of an API separator with the Bay. No flow was recorded during this mission. There was a significant amount of surface algae growth in the mud flats in the immediate vicinity of the outfall.

July - Locations "a" and "b" were discharging small volumes of wastewater. No apparent discoloration in the receiving water was observed. Location "c", likewise, had algae growth in the adjacent mud area.

B-6 April - No outfall indication.

July - A yellowish brown substance was being discharged from a submerged outfall as indicated.

B-7 April - A pipe entered the water from the base of the Standard Oil dock. No discharge was recorded.

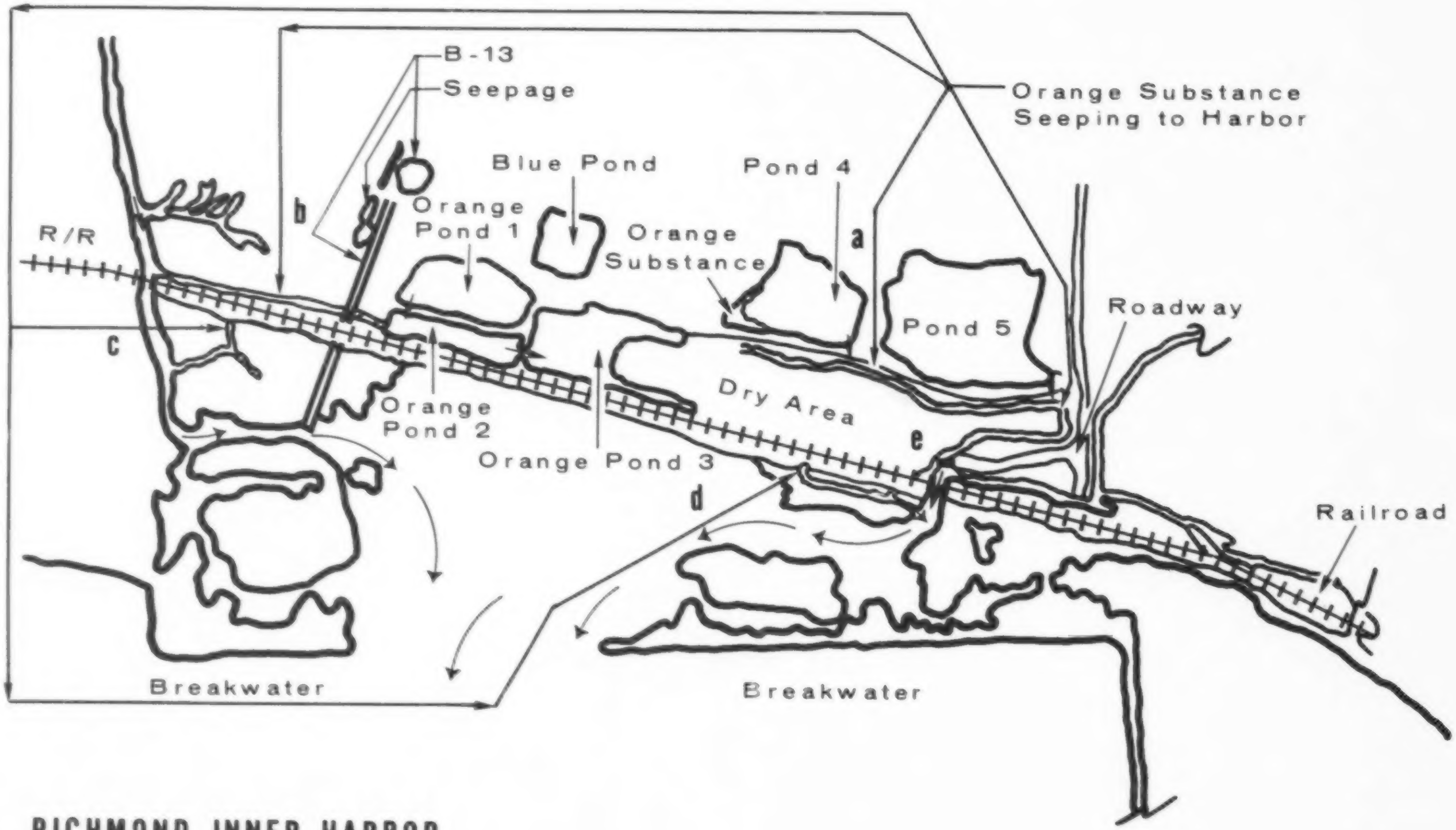
July - No discharge recorded.

B-8 April - A submerged outfall, discharging a dark grayish brown substance, was located between the two access ramps of the Standard Oil dock. The area was surrounded by a portable surface skimmer. It was containing nearly all of the effluent.

July - The outfall was not discharging.

NOTE: Indication numbers B-9 through B-21 appear on Figure 27, the Richmond map.

B-9	April -	A small effluent, positioned immediately above water level, was recorded. It produced no discoloration in the canal waters.
	July -	No outfall indication.
B-10	April -	An outfall was discharging a small amount of gray substance. The outfall position was immediately below the water's surface.
	July -	No discharge was recorded.
B-11	April -	A red pipe, 0.46 meters (1.5 feet) in diameter, entered the water. No discharge was noted.
	July -	No discharge was recorded.
B-12	April -	No discharge was recorded.
	July -	Water was being discharged into the Channel. It produced no discoloration in the receiving water.
B-13	April -	A pipe, 0.92 meters (3 feet) in diameter, connected a circular holding pond with the Richmond Inner Harbor. The pond contained a dark, nearly black, wastewater. No discharge was recorded.
	July -	No discharge was recorded. There was a seepage area detected adjacent to the circular pond in the location labeled as seepage in Figure 30. At the time of this mission, the seepage was not reaching the waterway projecting northward from the Harbor.


B-13
Seepage
Orange Substance
Seeping to Harbor
Blue Pond
Pond 4
b
Orange
Pond 1
Orange
Substance
a
R/R
Pond 5
Roadway
c
Dry Area
Orange
Pond 2
Orange Pond 3
e
d
Railroad
Breakwater
Breakwater

RICHMOND INNER HARBOR

Figure 30. Sketch of Locations B-13 and B-14

B-14 April - There were a group of five ponds located adjacent to the shore of the Richmond Inner Harbor as shown in Figure 30. Ponds 1, 2, and 3 contained a bright orange liquid substance. This waste was leaching to the Harbor in the four areas of the figure identified as a, b, c, and d. The wastewater was discharged into pond 1. It then flowed to pond 2 and subsequently to pond 3 as indicated by the respective arrows. The orange seepage is entering the small "c" waterway from under the railroad bed. Ponds 4 and 5 were also discharging to the rectangular shaped drainage ditch. The wastewater entered the Harbor through point "e." Pond 4 had an orange patch on its left side. This in turn was seeping to the upper end of the rectangular ditch.

July - Seepage to Harbor was also present.

B-15 April - No discharge from the Stege S.D. sewage treatment plant was detected.

July - No discharge confirmed.

Information received from EPA, Region IX, indicates that the effluent from this plant was re-routed to the East Bay MUD in January 1971.

B-16 April - The water flowing from Cerrito Creek into San Francisco Bay was slightly yellow-brown in color. It dispersed quickly in the adjacent mud flats.

July - The water from this creek was even more yellow-brown and quite turbid. It, likewise, dispersed quickly.

B-17 April - No discharge recorded.

July - A discharge was present at the time of flight. Its location is sketched in Figure 31. The landfill has changed significantly from that shown in Figure 27. The outfall produced only minor discoloration in the water.

B-18 April - A reddish-brown discoloration was recorded in the water at this location. The source of this effect could not be identified. There was a medium sized building situated near shore as indicated by the * on Figure 27.

July - The reddish-brown effect was again present. At this time of flight, there was chlorophyllic growth in the water and along shore as indicated by the parentheses.

B-19 April - One long and one short dike containing a dark grayish-brown water were discharging to the mud

53-A

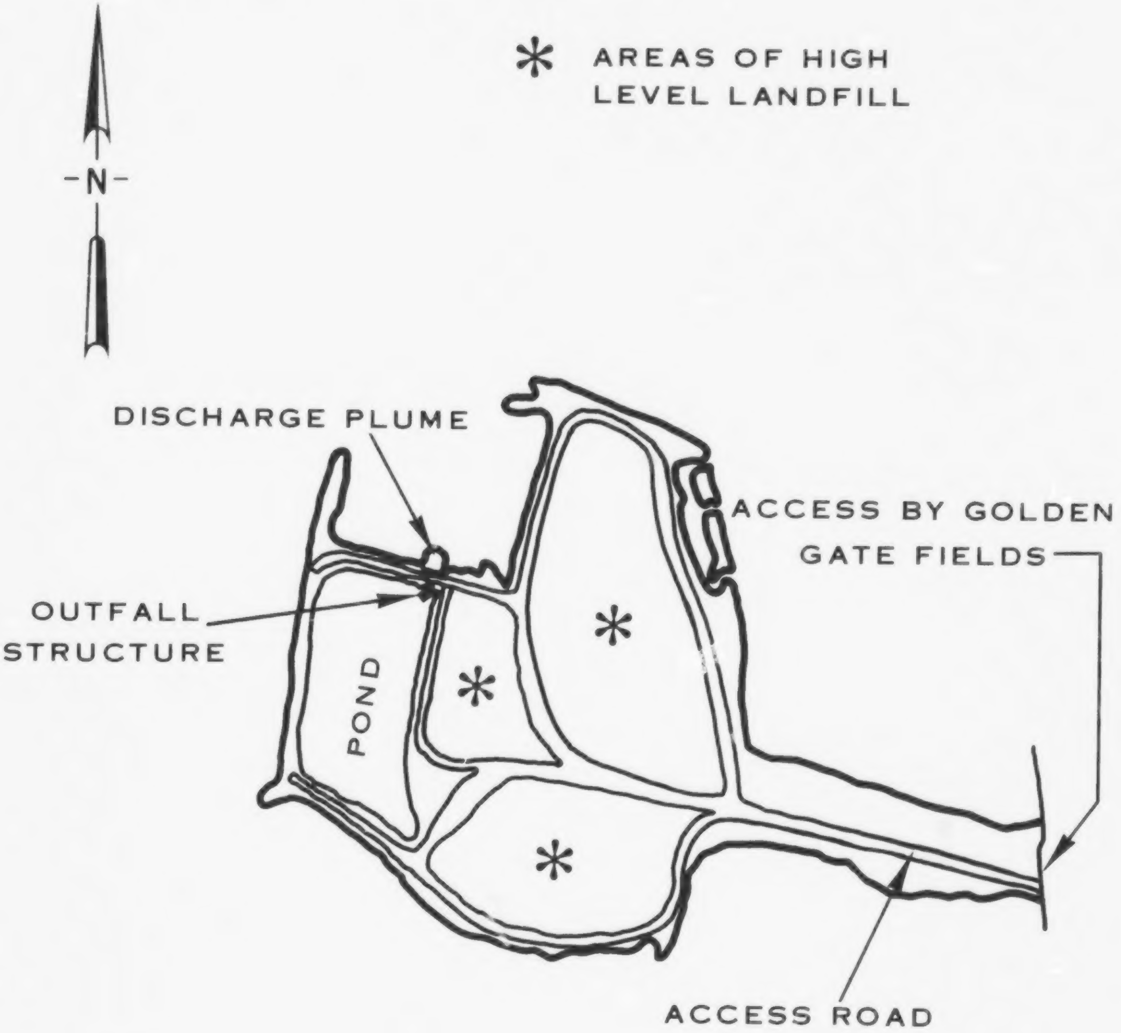

* AREAS OF HIGH LEVEL LANDFILL
-N-
DISCHARGE PLUME
ACCESS BY GOLDEN GATE FIELDS
OUTFALL STRUCTURE
POND
*
*
*
ACCESS ROAD

Figure 31. Sketch of Location B-17

flats through subsurface structures located by the red arrows. The origin of the long ditch, parallel to the freeway, appears to be the Golden Gate Fields stable area.

July - Same indication as April.

B-20 April - A large concrete culvert was recorded at this position. It appeared to be a storm drain.

July - Same indication as April.

B-21 April - A reddish-brown substance was being discharged from a concrete structure located by the arrow on the map. Small amounts of oil was collecting along shore and on the water in this triangular area. The source could not be determined.

July - The reddish-brown substance was again present. There was no trace of oil in this area.

Note: Indication numbers B-22 through B-27 appear on Figure 32, the Oakland West map.

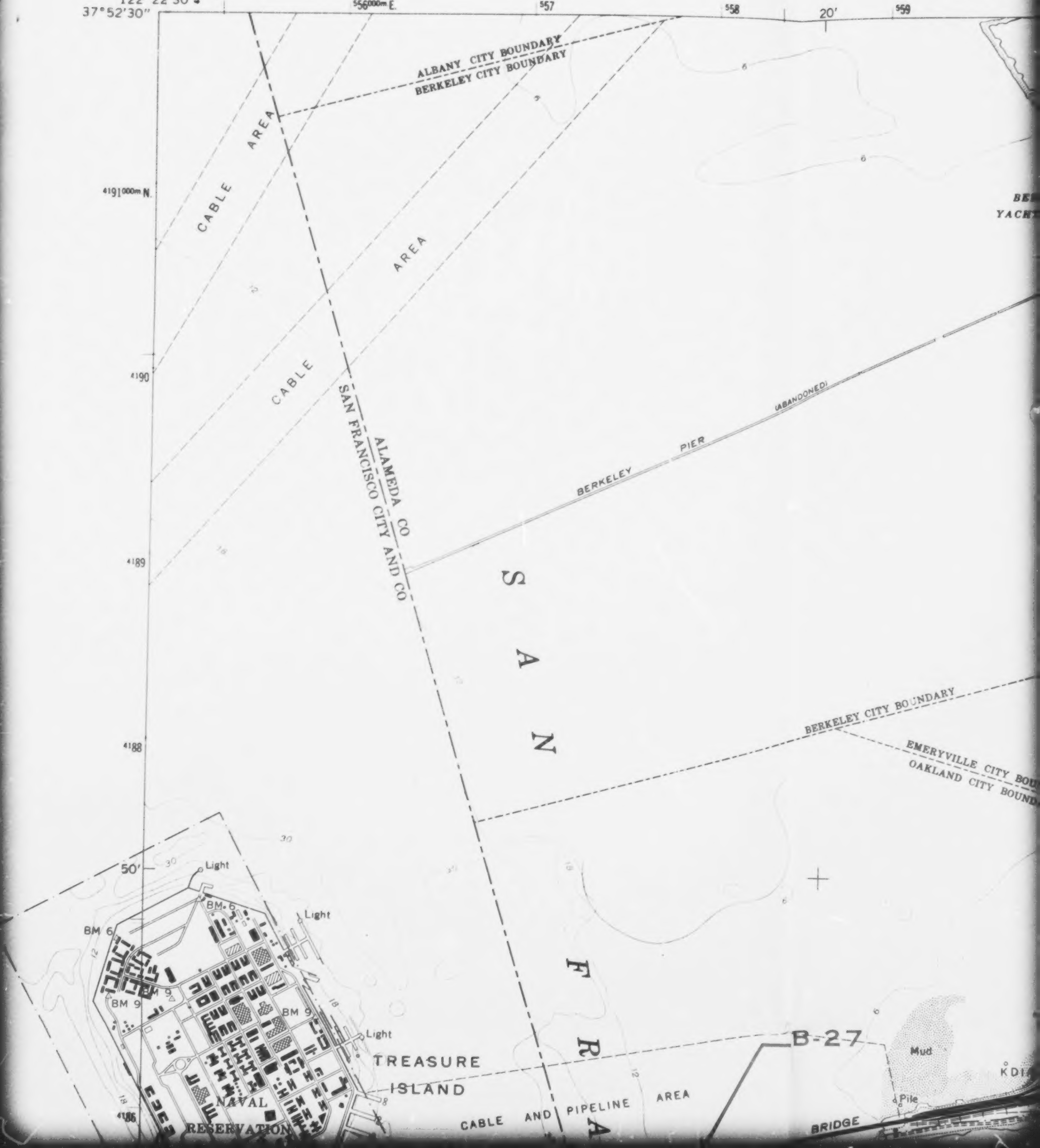
B-22 April - The water in the immediate area of the concrete culvert structure was yellow-gray in color. The source could not be determined.

July - Identical indication was recorded.

B-23 April - Water from a small ditch was being discharged from the street into the mud flats with no discoloration. Two buildings and a Holiday Inn were located directly across the street.

July - Identical indication was recorded.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY


1559 IV NW
(SAN QUENTIN)
122°22'30"
37°52'30"
556000m E.
557
558
20'
559
HARVEY O
ALBANY CITY BOUNDARY
BERKELEY CITY BOUNDARY
CABLE AREA
CABLE AREA
4191000m N.
4190
4189
4188
4186
50'
BE
YACHT
ALAMEDA CO
SAN FRANCISCO CITY AND CO
BERKELEY PIER (ABANDONED)
SAN FRA
BERKELEY CITY BOUNDARY
EMERYVILLE CITY BOU
OAKLAND CITY BOUND
6
18
12
30
Light
Light
Light
BM 6
BM 6
BM 9
BM 9
BM 9
TREASURE ISLAND
NAVAL RESERVATION
CABLE AND PIPELINE AREA
B-27
Mud
Pile
KDI
BRIDGE

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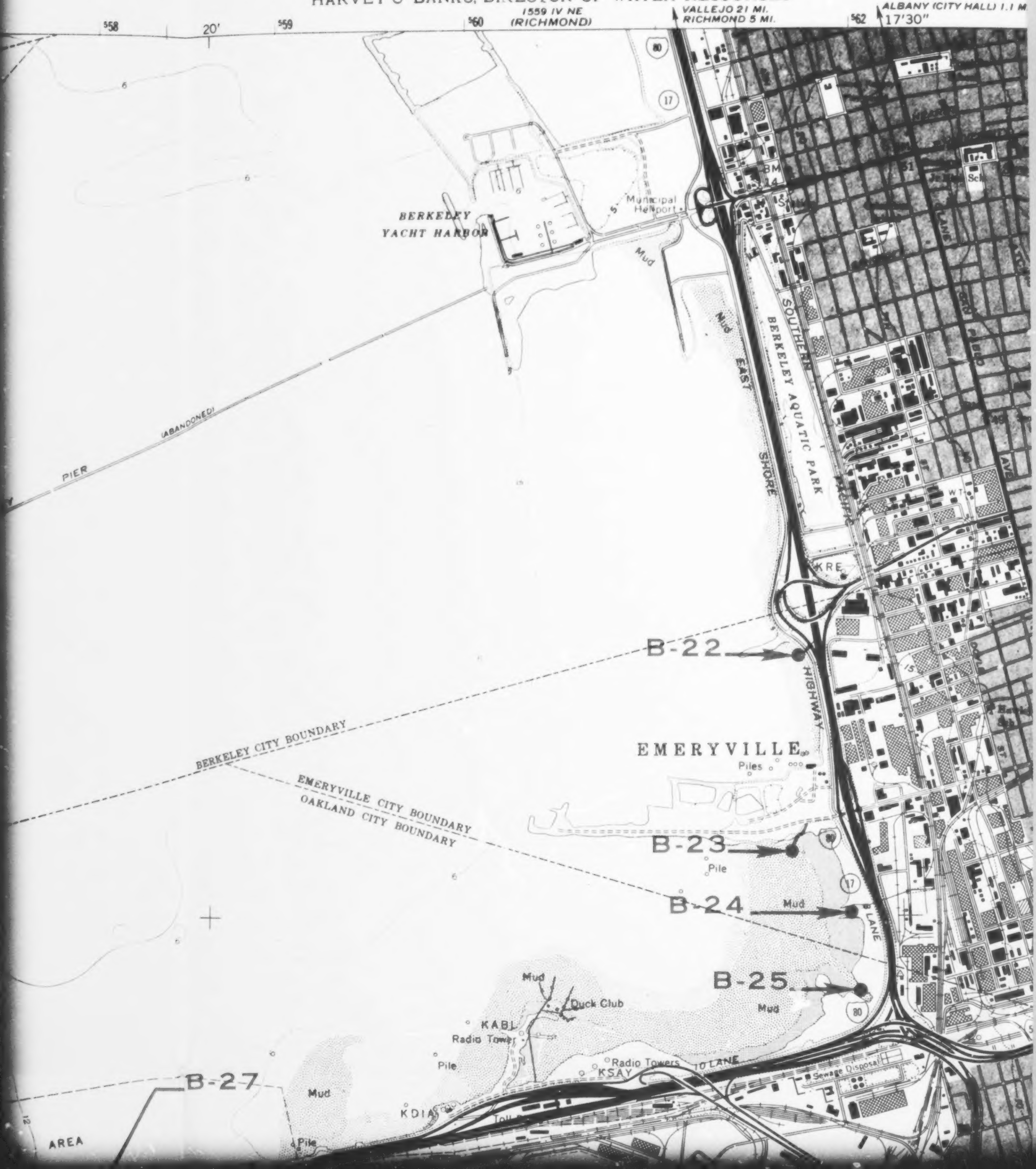
STATE OF CALIFORNIA
EDMUND G. BROWN, GOVERNOR
HARVEY O BANKS, DIRECTOR OF WATER RESOURCES


558
20'
559
560
1559 IV NE (RICHMOND)
VALLEJO 21 MI. RICHMOND 5 MI.
562
ALBANY (CITY HALL) 1.1 MI.
17'30"
80
17
BERKELEY YACHT HARBOR
Municipal Heliport
Mud
PIER (ABANDONED)
EAST SHORE
SOUTHERN PACIFIC
BERKELEY AQUATIC PARK
KRE
B-22
HIGHWAY
BERKELEY CITY BOUNDARY
EMERYVILLE
Piles
EMERYVILLE CITY BOUNDARY
OAKLAND CITY BOUNDARY
B-23
Pile
B-24
Mud
LANE
B-25
Mud
Duck Club
KABL Radio Tower
Pile
Radio Towers
KSAY
10 LANE
Sewage Disposal
B-27
Mud
KDIA
Toll
AREA
Pile

54-A

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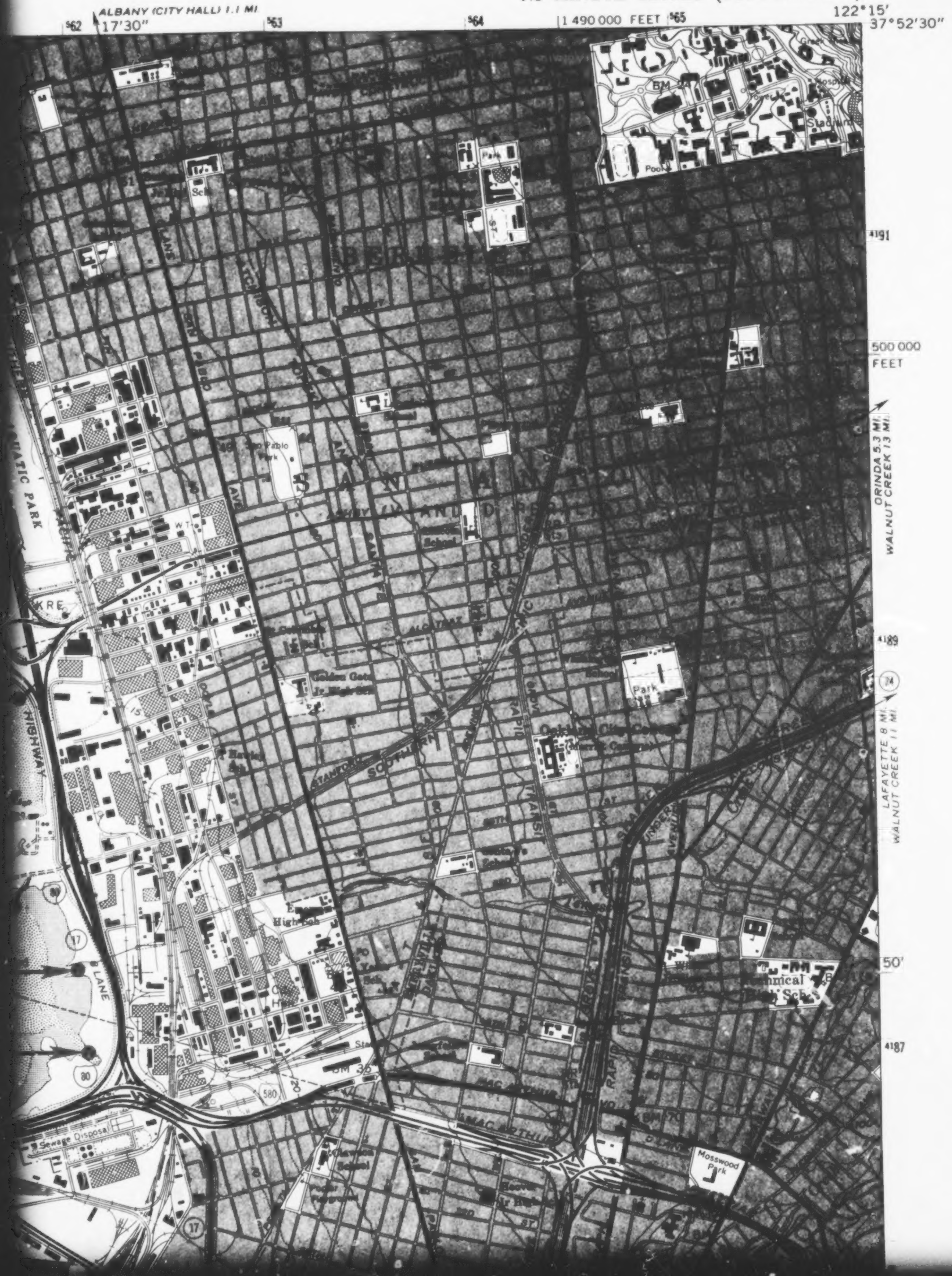
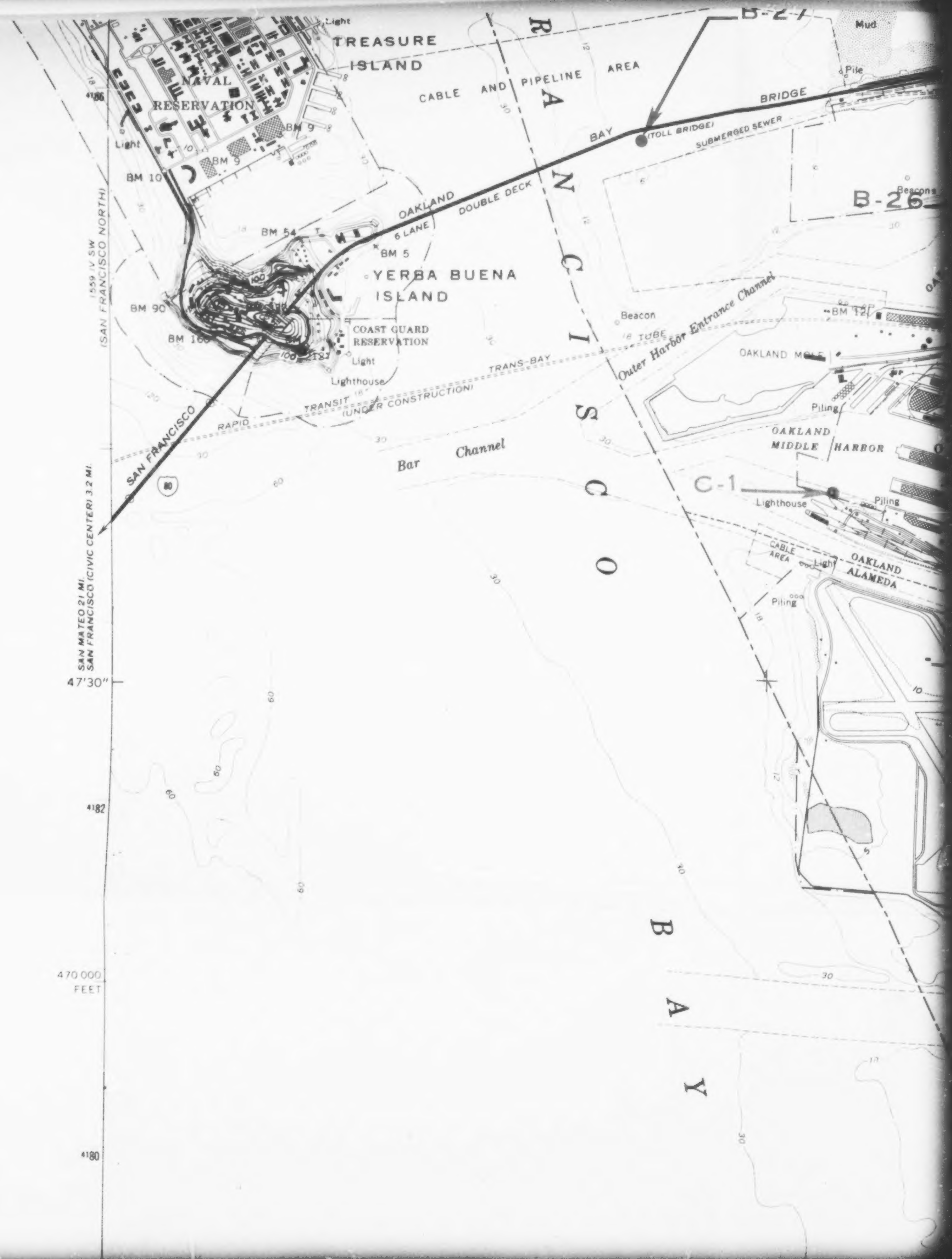
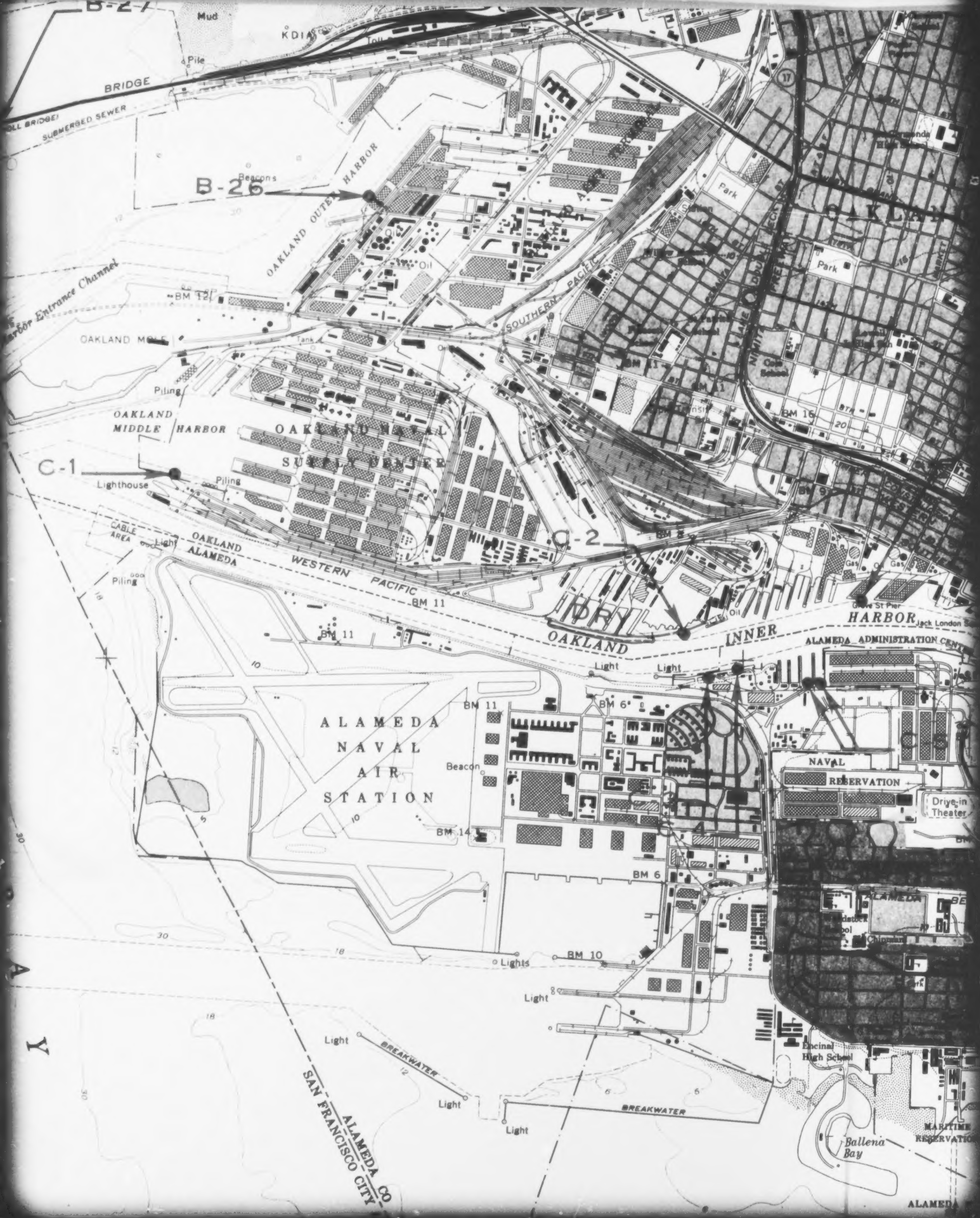
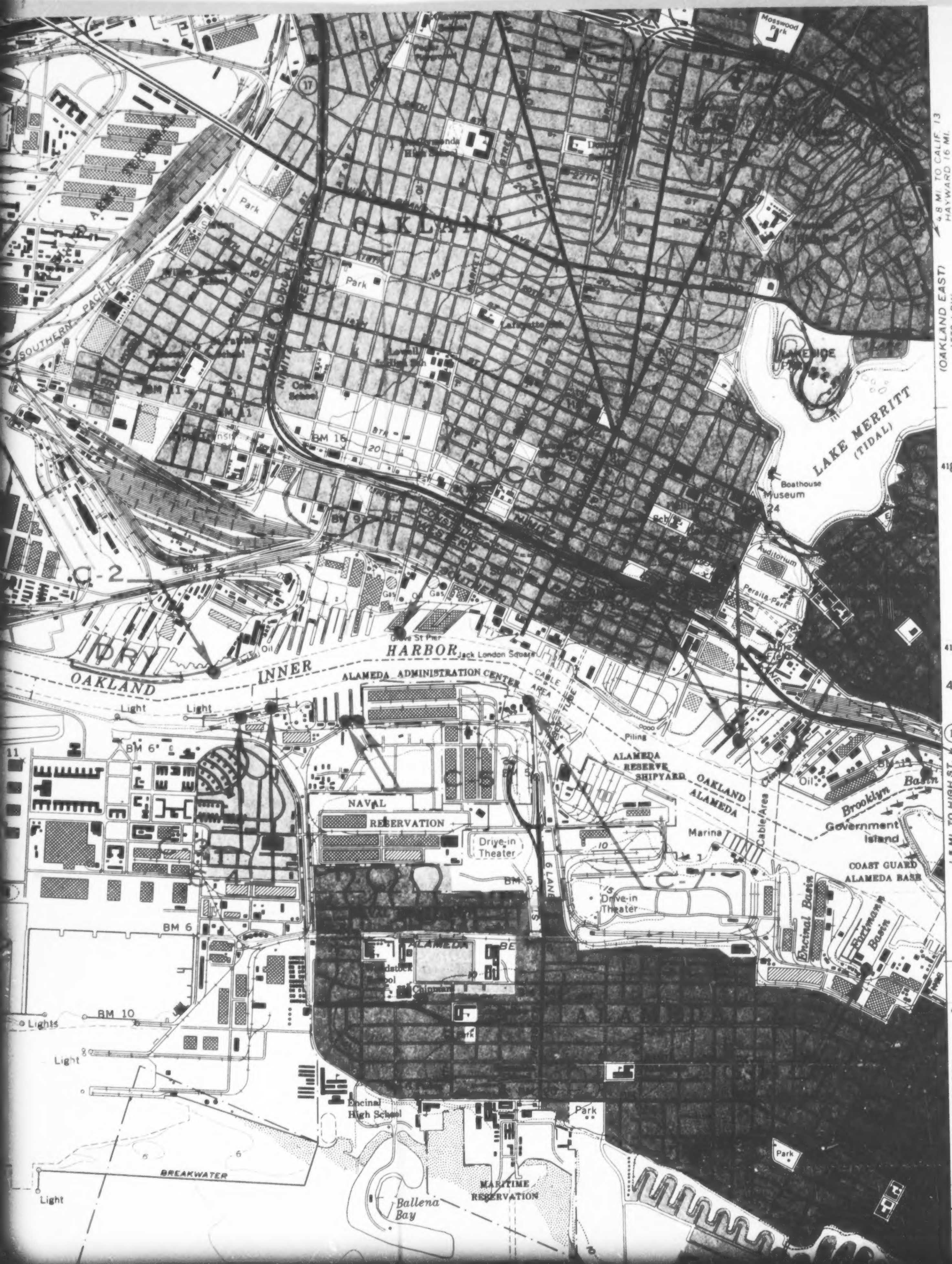
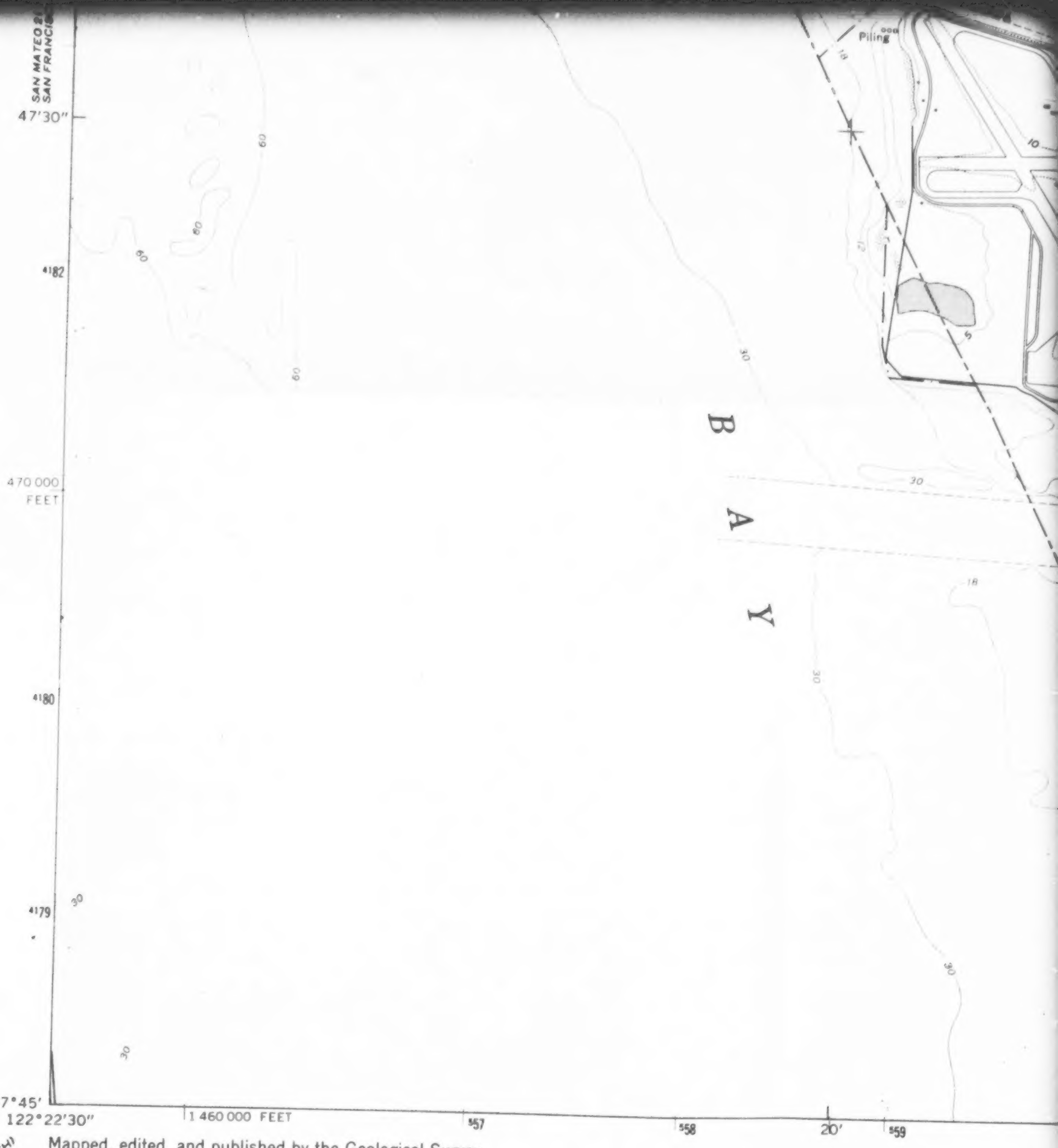
OAKLAND WEST QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)


ALBANY (CITY HALL) 1.1 MI.
562
17'30"
563
564
1 490 000 FEET
565
122°15'
37°52'30"
1559 I NW (BRIONES VALLEY)
4191
500 000 FEET
ORINDA 5.3 MI.
WALNUT CREEK 13 MI.
4189
74
LAFAYETTE 8 MI.
WALNUT CREEK 11 MI.
50'
4187
BM
Stadium
Pool
Park
Sch
San Pablo Park
AQUATIC PARK
W.T.
HIGHWAY
LANE
SOUTHERN
STANFORD
Golden Gate Jr. High Sch
Oakland City College
Park
Technical High Sch
Emery High Sch
BM 35
MAC ARTHUR
Mosswood Park
Sewage Disposal
580
80
17


TREASURE ISLAND
NAVAL RESERVATION
CABLE AND PIPELINE AREA
B-27
BAY BRIDGE
(TOLL BRIDGE)
SUBMERGED SEWER
Mud
Pile
Light
BM 9
BM 10
BM 54
BM 5
BM 90
BM 160
OAKLAND
6 LANE
DOUBLE DECK
YERBA BUENA ISLAND
COAST GUARD RESERVATION
Light
Lighthouse
B-26
Beacons
Beacon
BM 12
TUBE
Outer Harbor Entrance Channel
OAKLAND MOLE
TRANS-BAY
RAPID TRANSIT
(UNDER CONSTRUCTION)
SAN FRANCISCO
80
Bar Channel
Piling
OAKLAND MIDDLE HARBOR
C-1
Lighthouse
Piling
CABLE AREA
Light
OAKLAND
ALAMEDA
Piling
SAN FRANCISCO BAY
1559 IV SW
(SAN FRANCISCO NORTH)
SAN MATEO 21 MI.
SAN FRANCISCO (CIVIC CENTER) 3.2 MI.
4186
47'30"
4182
470 000
FEET
4180
12
18
30
60
100
10
5


B-27
Mud
KDIA
Toll
Pile
BRIDGE
TOLL BRIDGE
SUBMERGED SEWER
Beacons
B-26
OAKLAND OUTER HARBOR
Oil
Harbor Entrance Channel
BM 12
OAKLAND MOLE
Tank
SOUTHERN PACIFIC
Park
OAKLAND
Park
17
NIMITZ FREEWAY
Cole School
BM 16
BM 11
Piling
OAKLAND MIDDLE HARBOR
OAKLAND NAVAL SUPPLY CENTER
C-1
Lighthouse
Piling
CABLE AREA
Light
OAKLAND
ALAMEDA
WESTERN PACIFIC
C-2
BM 9
Gas
Oil
Grove St Pier
Jack London Sq
HARBOR
Piling
18
BM 11
BM 11
DRY
Oil
OAKLAND
INNER
ALAMEDA ADMINISTRATION CENTER
Light
Light
10
BM 11
BM 6
ALAMEDA NAVAL AIR STATION
Beacon
10
BM 14
NAVAL RESERVATION
Drive-in Theater
4
BM 6
ALAMEDA
Woodstock School
Chipman
Park
30
30
18
Lights
BM 10
Light
18
Light
BREAKWATER
12
Light
Light
6
BREAKWATER
6
Encinal High School
Ballena Bay
MARITIME RESERVATION
ALAMEDA CO
SAN FRANCISCO CITY
30
A
Y
ALAMEDA


Mosswood Park
17
McClymonds High School
OAKLAND
Park
Lafayette Sch
Lowell Jr High Sch
Cole School
SOUTHERN PACIFIC
NIMITZ FREEWAY
BM 16
BM 11
BM 9
BM 21
LAKESIDE PARK
LAKE MERRITT (TIDAL)
Boathouse
Museum
24
Auditorium
Peralta Park
C-2
C-5
DRY
OAKLAND INNER HARBOR
Grove St Pier
Jack London Square
Gas
Oil
ALAMEDA ADMINISTRATION CENTER
CABLE AREA
Light
BM 6
11
NAVAL RESERVATION
Drive-in Theater
BM 5
6 LANE
ALAMEDA RESERVE SHIPYARD
OAKLAND ALAMEDA
Cable Area
Piling
Marina
Brooklyn Basin
Government Island
COAST GUARD ALAMEDA BASE
Encinal Basin
Fortmann Basin
ALAMEDA
Woodstock School
Chipman
BM 10
Lights
Light
Encinal High School
Park
BREAKWATER
6
MARITIME RESERVATION
Ballena Bay
Park
4.8 MI. TO CALIF. 13
HAYWARD 16 MI.
(OAKLAND EAST)
1559 I SW
4184
4183
47'30"
4181
1.5 MI. TO HIGH ST.
SAN JOSE 40 MI.
OAKLAND AIRPORT 3.3 MI.
SAN LEANDRO (14TH ST.) 7.3 MI.


SAN MATEO 2
SAN FRANCIS
47'30"
4182
470 000
FEET
4180
4179
37°45'
122°22'30"
1 460 000 FEET
557
558
20'
559
Piling
B A Y
60
30
18
12
10
5

(SAN FRANCISCO SOUTH)
1559 III NW

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

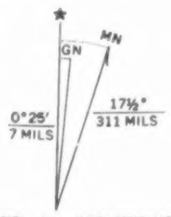
Topography from aerial photographs by photogrammetric methods and by planetable surveys 1947. Revised from aerial photographs taken 1958. Field check 1959

Hydrography compiled from USC&GS charts 5532 and 5535 (1958)

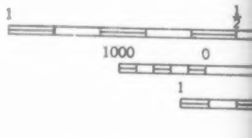
Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system, zone 3
1000-meter Universal Transverse Mercator grid ticks,
zone 10, shown in blue

Red tint indicates areas in which only landmark buildings are shown

San Antonio grant boundary omitted because of insufficient data

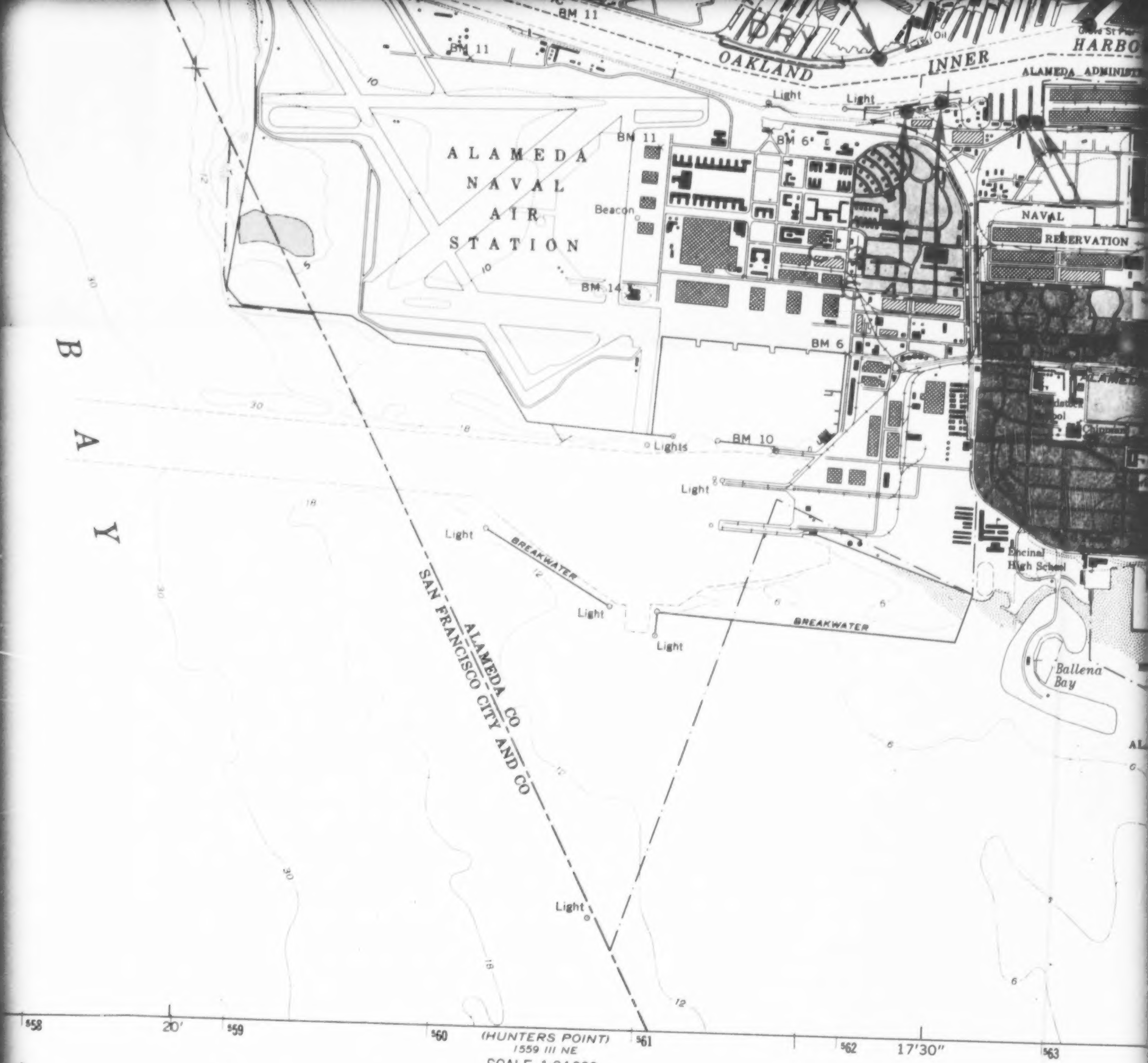

★
GN
MN
0°25'
7 MILS
17½°
311 MILS

UTM GRID AND 1968 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

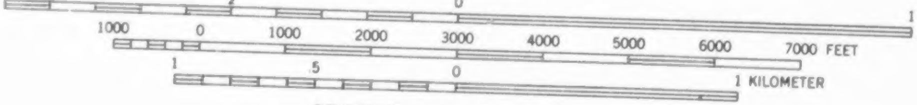


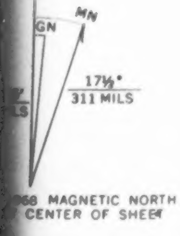
DEPTH CU
SHORELINE

THIS MAF
FOR SALE BY U. S. GEOLOG
A FOLDER DESCRIBII


BM 11
OAKLAND
INNER
HARBO
Oil
ALAMEDA ADMINISTR
Light
Light
ALAMEDA
NAVAL
AIR
STATION
BM 11
BM 6
Beacon
BM 14
BM 6
NAVAL
RESERVATION
BAY
BM 10
Lights
Light
Light
BREAKWATER
Light
Light
BREAKWATER
Encinal
High School
Ballena
Bay
ALAMEDA CO
SAN FRANCISCO CITY AND CO
Light
30
18
12
10
6
5
558
20′
559
560
561
562
17′30″
563
(HUNTERS POINT)
1559 III NE

SCALE 1:24 000


1
½
0
1 MILE
1000
0
1000
2000
3000
4000
5000
6000
7000 FEET
1
.5
0
1 KILOMETER


GN
MN
17½°
311 MILS
968 MAGNETIC NORTH
CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 5 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

Data shown in purple compile
taken 1968. This informatio

Purple tint indicates extensio

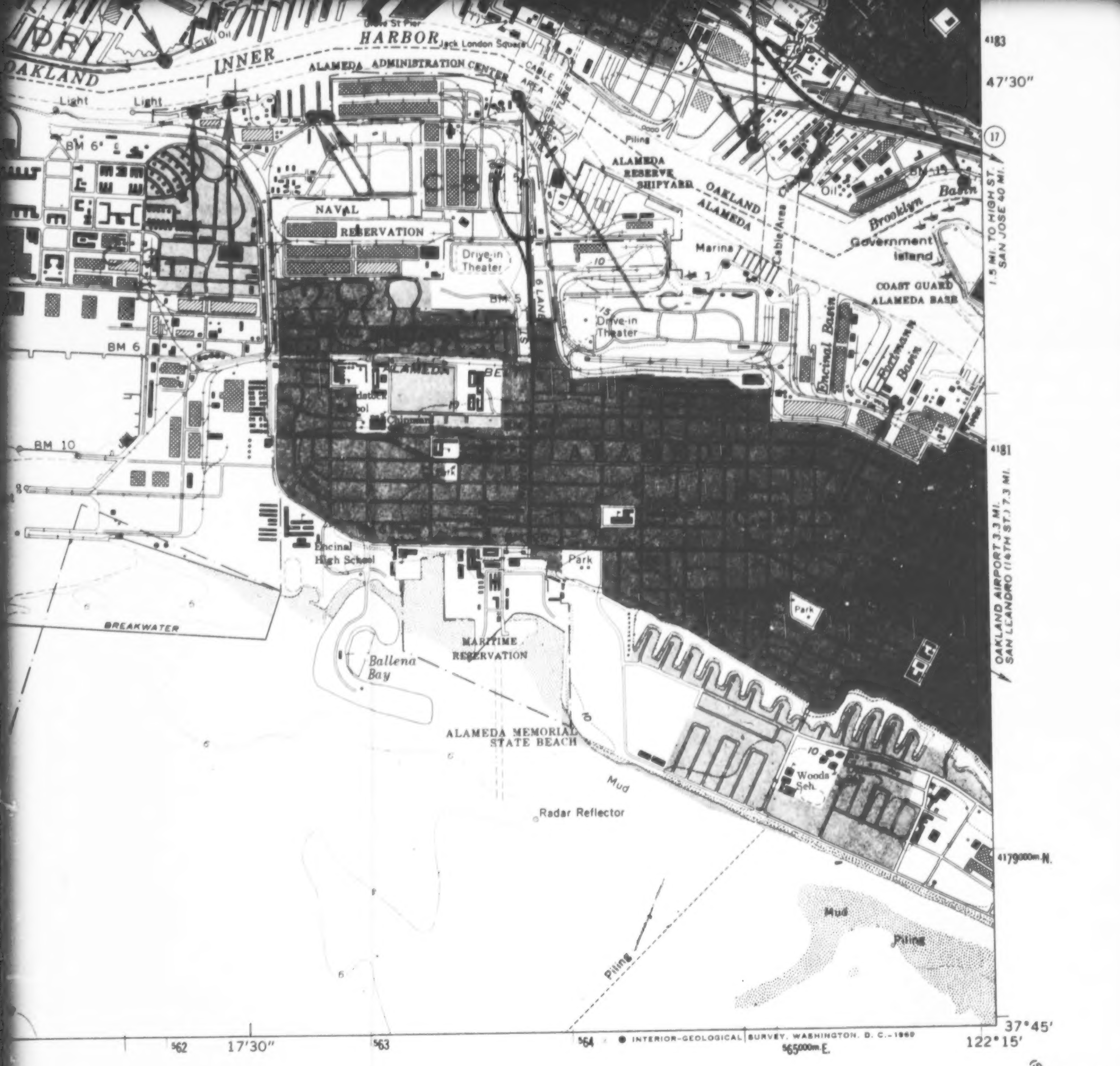

HARBOR
INNER
OAKLAND
Jack London Square
ALAMEDA ADMINISTRATION CENTER
CABLE AREA
Light
Light
BM 6
NAVAL
RESERVATION
Drive-in Theater
BM 5
ALAMEDA RESERVE SHIPYARD
OAKLAND
ALAMEDA
Marina
Brooklyn Basin
Government Island
COAST GUARD ALAMEDA BASE
Encinal Basin
Fortmann Basin
Drive-in Theater
BM 6
BM 10
ALAMEDA
Encinal High School
Park
Park
BREAKWATER
Ballena Bay
MARITIME RESERVATION
ALAMEDA MEMORIAL STATE BEACH
Mud
Radar Reflector
Woods Sch.
Mud
Piling
Piling
Piling
4183
47'30"
4181
4179000m.N.
37°45'
122°15'
562
17'30"
563
564
565000m.E.
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1969
1.5 MI. TO HIGH ST.
SAN JOSE 40 MI.
OAKLAND AIRPORT 3.3 MI.
SAN LEANDRO (14TH ST.) 7.3 MI.
(SAN LEANDRO)
1559 II NW
1 MILE
6000
7000 FEET
1 KILOMETER
LOW WATER
HIGH WATER
STANDARDS
25 OR WASHINGTON, D. C. 20242
VAILABLE ON REQUEST
CALIF
QUADRANGLE LOCATION

Figure 32.

Data shown in purple compiled from aerial photographs taken 1968. This information not field checked

Purple tint indicates extension of urban areas

OAKLAND WEST, CALIF.
N3745—W12215/7.5

1959
PHOTOREVISED 1968
AMS 1559 IV SE—SERIES V895

B-24 April - A grayish green substance was being discharged through the rather large open conduit into the Bay. The source appeared to be within the buildings as indicated in Figure 33.

July - Again, this discharge was present. The wastewater displayed an even more intense green color during this mission. Its color characteristics suggest an organic waste.

B-25 April - A gray substance was present in the small ditch, as indicated in Figure 33, at the time of flight. The flow rate was quite small. The receiving water in the rectangular area, adjacent to Interstate 80, was grayish green in color. There was a discharge structure in the upper end of this area, which appeared to be a storm drain.

July - Identical indication was recorded.

B-26 April - A brownish-yellow substance was being discharged into the Oakland Outer Harbor at the point indicated by the arrow in Figure 32. The plume extended approximately 15 meters (50 feet) into the Harbor from the dock.

July - No indication was present at the time of flight.

B-27 April - A plume, caused by the submerged outfall from the East Bay MUD STP, was clearly visible at the time of flight. It is shown in Figure 34.

55-A

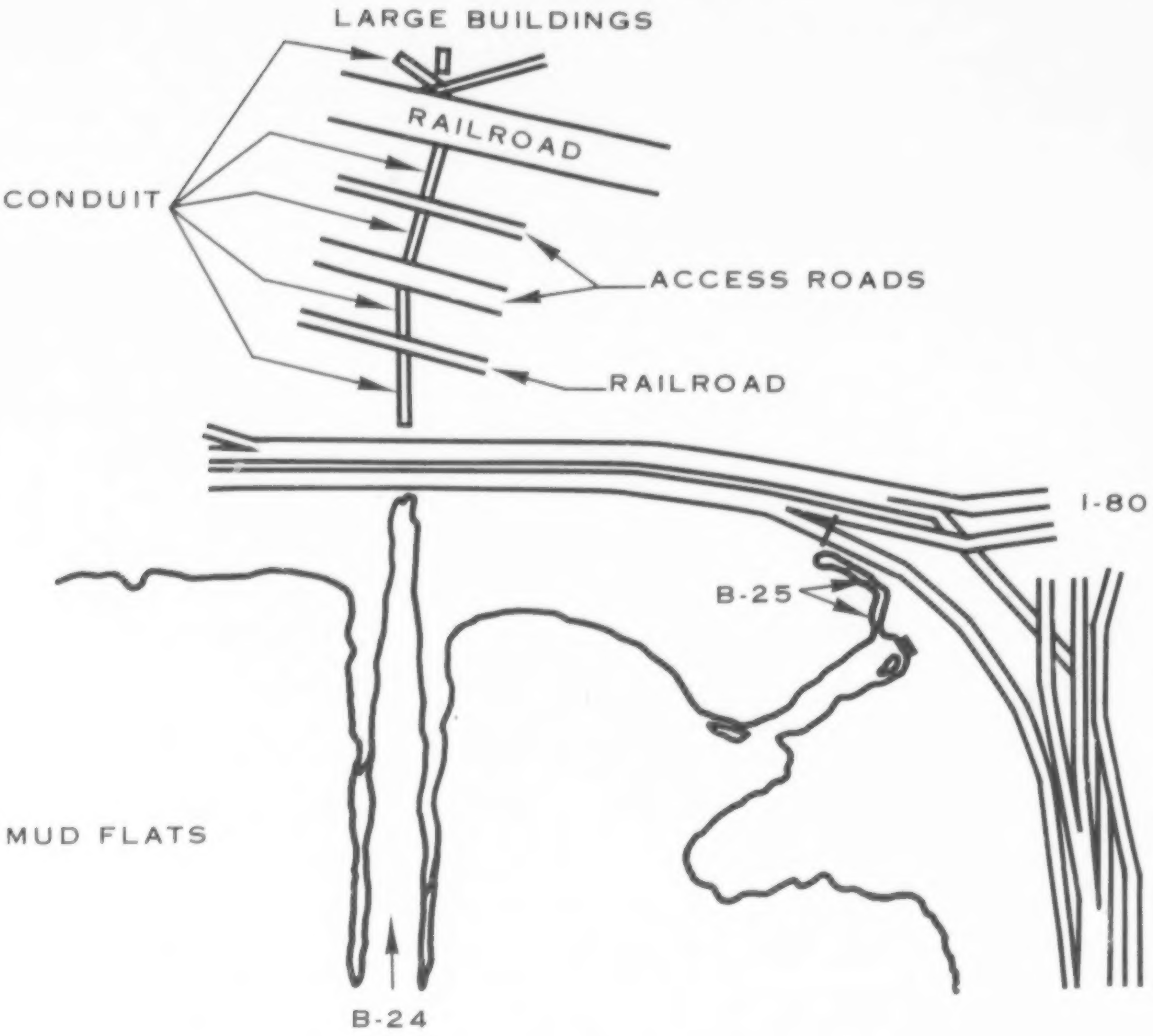

LARGE BUILDINGS
RAILROAD
CONDUIT
ACCESS ROADS
RAILROAD
I-80
B-25
MUD FLATS
B-24

Figure 33. Sketch of Locations B-24 and B-25

Reproduced from best available copy.

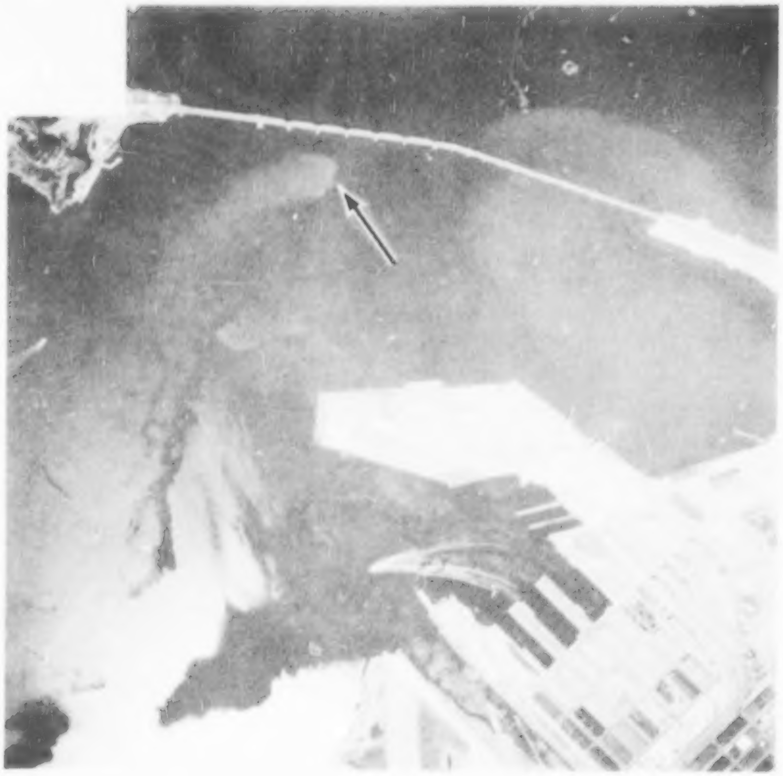


Figure 34. Photograph of Plume from East Bay M.U.D. Discharge (High Altitude)

July - A nearly identical indication was recorded during this flight as shown in Figure 35.

"July Night" - The thermal map of this area showed no temperature difference at the water surface during this mission.

B-28 April - The San Quentin STP was discharging at this location. It produced a gray-brown discoloration on the receiving waters.

July - No visible discoloration recorded.

B-29 April - An outfall from the quarry was discharging a gray-green substance at the time of flight. It formed only a small plume.

July - Target was not covered.

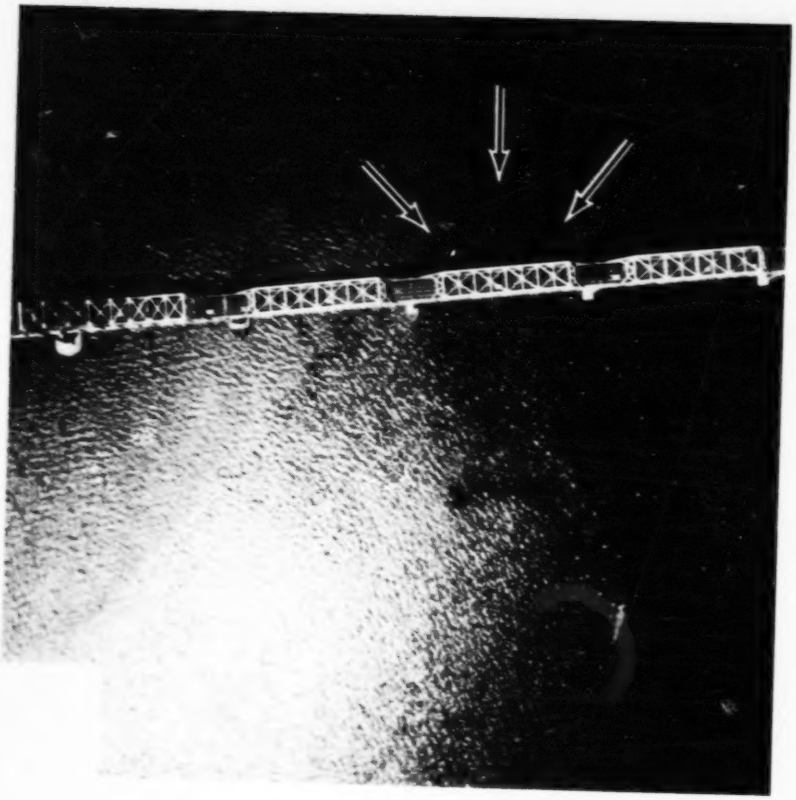


Figure 35. Photograph of Plane from East Bay M.U.D. Discharge (Low Altitude)